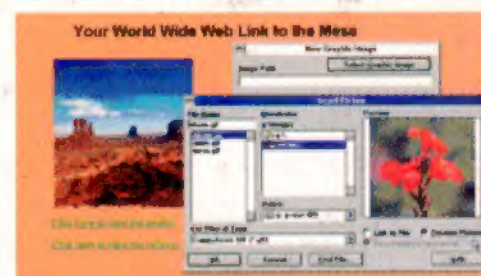


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Not surprisingly, before Marni brings her students to the mountain, she brings the mountain to her students. With PowerPoint 4.0, the leading presentation graphics software.

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her create the right look for

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What really makes Marni content at the end of the day is the power to take her students up that imaginary mountain and see them safely down again. (The only bruises the students



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have to show for their exhilarating descent are imaginary.)

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Inside

Chances are that you or someone you know works out of a small office or home office. And while small offices come in many shapes and flavors, one thing they lack is a huge infrastructure. There's no one to answer phones, fix computers,

send faxes, do research, account for time and billing, or market products. When the brawn of the traditional office is gone, you've got to rely on brains. Part of being brainy is knowing when technology can help you.

This issue of *PC Magazine* takes a look at the products that make the small office tick. And

wrote this issue's cover story, "Small-Office Power," has a home office to die for. Jim's current state-of-the-art includes a sophisticated network, about a half-dozen computers, Kurzweil synthesizers and Mackie mixers (he's a composer, too), fax, videoconferencing, a MacroTel hybrid digital/analog PBX, and ISDN everywhere.



Columnist Jim Seymour's corporate headquarters

In our story, Seymour gives you no-nonsense buying advice for all your small-office components: everything from the perfect telephone system to utilities and integrated software, from the best small-office PCs to networks you can manage alone.

Other small-office accoutrements include

PC Magazine is no stranger to that ticking. Every editor here has some form of home office, e-mail, or remote dial-in capabilities. Most of our longtime contributors seldom make the trek to our New York headquarters. They don't have to. In fact, John Quain, Alfred Poor, M. David Stone, and Bruce Brown spent months talking to us about product-testing issues, on-line, without ever meeting with us face-to-face.

Columnist Jim Seymour, who

a new breed of multifunction peripherals—combination printer, fax, and copier machines. Do these hydras work, or does more go wrong as you pack more in a box? Find out in "Swiss Army Printers." And certainly the two best-loved small-office tools, the telephone and the computer, are finally trying to work together. Find out how to get in on the action as we review voice mail products in "At the Sound of the Beep..."—*Robin Raskin*

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CIRCLE 292 ON READER SERVICE CARD

UP FRONT

Inside

Small (office) is beautiful....4

Letters

On-line services: different strokes for different folks...19

Trends

- Taming the text tiger
- Impending monitor shortage
- Satan: Good or evil?
- Virtual reality on the Web.....29

First Looks

- HP LaserJet 5MP



- Compaq Presario CDS 774
- KPT Convolver
- NeuralWorks Predict.....37

New & Improved

BY ASA SOMERS.....61

Read Only

EDITED BY TIN ALBANO69

COLUMNISTS

Michael J. Miller

Suite Renovations75

Bill Machrone

ISDN for the Masses?
Not Quite.....83
Second Looks.....85

John C. Dvorak

Is Bob Really
a Kidsworld?89
Inside Track.....91

Jim Seymour

Stick a Rainbow in Your Bag.....93

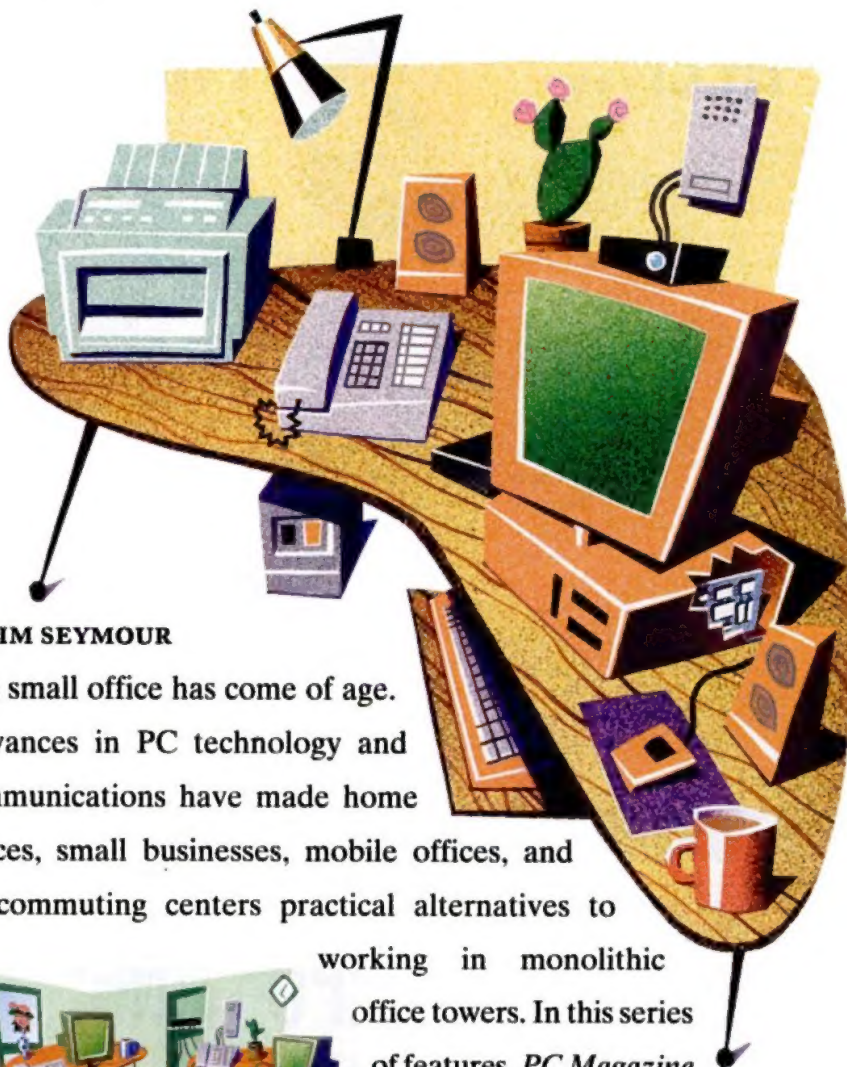
Bill Howard

Real Solutions to Real Problems95

COVER STORY

PCs

SMALL-OFFICE POWER



BY JIM SEYMOUR

The small office has come of age. Advances in PC technology and communications have made home offices, small businesses, mobile offices, and telecommuting centers practical alternatives to

working in monolithic office towers. In this series of features, *PC Magazine* takes a comprehensive look at the hardware, software, and communications tools you'll need to flourish on your own. Our veteran home-office contributors show you



how to make the most of on-line resources. They also share some tips on legal issues such as insurance and taxes so that you won't have to discover pitfalls the hard way102

Legal Issues for the Small Office.....110
Cyberspace: The Great Equalizer.....112
Small-Office Software120

Telephony Software

AT THE SOUND OF THE BEEP...

BY M. DAVID STONE

Voice mail for small businesses has arrived. Once the emblem of a large company, telephony software gives anyone with a PC an affordable, sophisticated-sounding voice mail system that also lets users send, receive, and forward fax messages. We review nine products targeted at your messaging needs and look at a wealth of voice-messaging options within your company's budget.....123



Hardware

SWISS ARMY PRINTERS



BY M. DAVID STONE

One dilemma facing the wave of at-home entrepreneurs is how to get printing, faxing, copying, and scanning capabilities without breaking the bank or filling the workspace with office appliances. The new breed of multifunction printers can deliver a mix of functionality in one compact unit that usually costs less than buying separate machines. Cast from different molds, these printers vary widely in price, performance, and features. We evaluate 16 units to show you which ones are tailored to your needs.....172

Products reviewed:	The Voice Mail Spectrum.....128
<i>Cheyenne BitWare for</i>	Answering Machines on
<i>Windows 3.24.....143</i>	Steroids.....142
<i>ExpressFax+ 3.0a.....145</i>	Suitability to Task.....143
<i>FaxWorks Voice 3.0.....145</i>	Messages Without
<i>MultiExpressPCS 3.2.....159</i>	the Machine.....144
<i>Multimedia Connect 1.6.2.....159</i>	Voice Mail—Equipped PCs.....150
<i>ObjIX Media Manager 1.03..163</i>	Telephone Meets
<i>QuickLink</i>	Sound Card.....152
<i>MessageCenter 2.0.....164</i>	Creative Labs' Phone Blaster:
<i>SuperVoice 2.0e.....166</i>	Not Just Games.....160
<i>VoiceFX 3.0.....170</i>	Summary of Features.....162
Editors' Choice.....124	The Next Step Up.....170

Products reviewed:	Relisys HomeScan Avec 140..204
<i>Brother Multi-Function</i>	Ricoh MV715.....204
<i>Center 4500 ML.....179</i>	Toshiba TF505.....205
<i>Canon Faxphone B-170.....184</i>	Xerox 3002.....207
<i>HP OfficeJet.....188</i>	Xerox 3004.....207
<i>JetFax 4.....196</i>	Xerox 3006.....207
<i>Lanier 5010 MFD.....196</i>	Suitability to Task.....174
<i>Okidata Doc-It 4000.....199</i>	Editors' Choice.....175
<i>Panasonic PFC KX-SP100.....201</i>	Multifunction Others.....185
<i>QMS 2001</i>	Performance Tests.....192
<i>Knowledge System.....202</i>	Summary of Features.....200

FEATURES

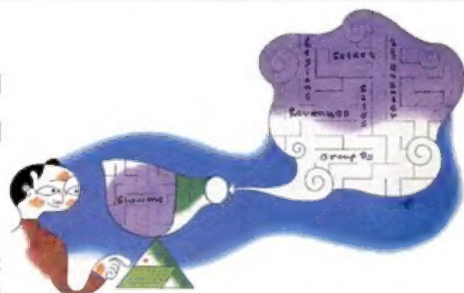
Applications Development

SQL QUERY AND REPORTING:
Straight Answers, Limited Risks

BY BRIAN BUTLER AND THOMAS MACE

You need to compare last quarter's sales figures against this quarter's. But the sales data resides in the corporate SQL database, which is a tricky place to navigate. The newest query and reporting

tools let you access that data without being a database expert, but how much do you really need to know about your database to use them? Are the figures they report the ones you thought you requested? Can your database adminis-



trator set up these tools for easy use by the database-illiterate? We gauge the power, safety, and built-in intelligence of seven packages to find out.....209

Products reviewed:	
<i>Borland Report Smith</i>	
<i>for Windows 2.5.....214</i>	
<i>BusinessObjects 3.1.....220</i>	
<i>Crystal Reports Professional 4.0.....222</i>	

<i>Esperant 2.1.....230</i>	
<i>InfoMaker for Windows 4.0.....235</i>	
<i>Intersolv Q+E 6.1.....238</i>	
<i>Visualizer for OS/2 1.11.....240</i>	
<i>Anatomy of a Query Tool.....210</i>	

Editors' Choice.....211	
Highlights.....214	
Suitability to Task.....216	
Usability Testing.....227	
Summary of Features.....234	

NETWORK EDITION

Follows page 96

Flexing Your Backup MuscleNE1

- ARCserve for NetWare, Windows Edition 5.01.....NE10
- Legato NetWorker 3.1

for NetWare.....NE16

- The Norton Enterprise Backup.....NE19

First Looks

- Caravelle Watcher 2.0.....NE21
- Shiva NetModem/E 3.5 and

Shiva LANRover/E 3.5.....NE21

- SMC EtherPower 10/100.....NE24
- Modem Assist PLUS 4.0.....NE29

Multiple Access

BY STEVE BUEHLER
What ISDN Needs.....NE29

PC TECH

User-to-User

BY NEIL J. RUBENKING

How do you delete or move all the files with the same extension? Organizing your AUTOEXEC.BAT file245

Tutor

BY JEFF PROSISE

Is VFAT Ready for Prime Time?247

Corporate Developer

BY BARRY SIMON

Designing with Style: The Win95 User Interface255

Toolkits

BY JONATHAN WALDMAN

Create One-File Windows Programs...259

Power Programming

BY RAY DUNCAN

An HTML Primer261

Utilities

BY NEIL J. RUBENKING

Change a Program's Address with COA.....273

PC SOLUTIONS

Hardware

Distortion caused by turning a monitor on its side; a display driver that's compatible with your software283

Operating Environments

Taking control of Windows' Control Panel; a technique for terminating batch file processing.....284

Word Processing

Inserting merge fields in Word for Windows 6.0 and in 2.0300

Spreadsheets

When files are too large to import into your spreadsheet program300

Databases

Two third-party wizards help you create mail-merges and envelopes in Microsoft Access 2.0308



A softer look—the Windows 95 user interface (page 255).

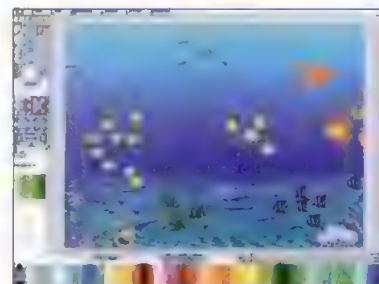
AFTER HOURS

Not Just for Kids

- All the fun, none of the fuss: Kids' creativity software
- CD-ROM Pick Hit: Material World
- Kids: Better Homes and Gardens Cool Crafts
- Kids: KidMail Connection
- Spotlight on Adventure: Under a Killing Moon
- Quick Clips375

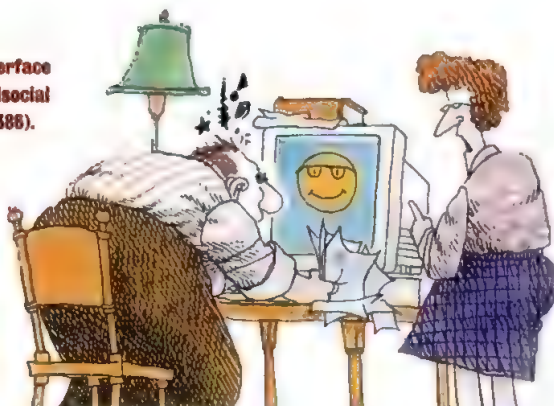
Abort, Retry, Fail?

BY DON WILLMOTT386



Enjoy an underwater adventure with Flying Colors (page 376).

The social interface meets an antisocial user (page 386).



ALSO IN THIS ISSUE

PC Direct.....	283
Marketplace	335
Premier	335
Classified	348
BusinessCard	366
Reader Service Card	351
Advertisers' Index: Companies.....	369
Advertisers' Index: Products.....	370
Coming Up	372
Editorial Product Index	373

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PC Magazine Reviews

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the speed trap.



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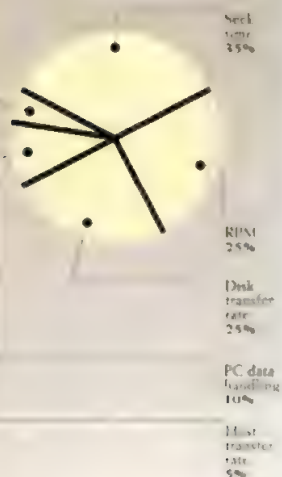
Some think seek time or the latest host transfer buzzwords like Mode 4 PIO represent a drive's performance. In actuality, a drive's performance is the combination of media rates, buffer sizes and host rates, as well as seek and spin times. So it hardly matters how impressive a drive's individual speed specs are if the other factors hamper its overall performance.

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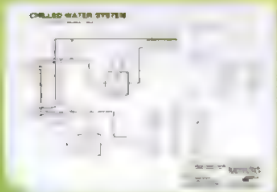


MOTOROLA MOTSAN "Visio" allows the elimination of more than five software products. Visio should be a standard utility on all Windows"-based PCs because of its ability to provide double-digit productivity improvements." *Dave Crumpton (Director of MOTsan SE)*

FLUOR DANIEL "We standardized on Visio for all work flow diagrams—company wide. Visio is the easiest way to deliver even the most complicated drawings." *Ken Cain (Director of Information Services)*



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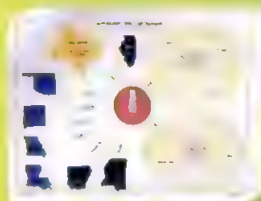


engineering cost significantly." *Bill Huth (Manager Field Design Engineering)*



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CHRYSLER "At Chrysler, Visio lets us annotate and view CAD drawings which formerly were annotated in an unfriendly fashion on a mainframe. Visio's modern interface makes using PC-based graphics easy for everyone." *Robert Levy (System Analyst)*

SMITH BARNEY "Never seen a product make people so productive, so quickly." *Doug MacLean (Senior LAN Administrator)*

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Business drawing for people whose business isn't drawing."

Letters

THE CHAMELEON QUALITIES OF ON-LINE

On-line services seem destined to be forever reinventing themselves to suit different needs and changing times. The responses we received to our story "The Changing Face of On-Line" (February 21, 1995) reflect why on-line services will continue to come in a wide variety of flavors.

Your article was an accurate and fair assessment of the commercial on-line services. I would like to point out that contrary to your review, America Online (AOL) does have 14.4-Kbps access at no extra charge.

BETH VILLANYI, via the Internet

AOL was just introducing its 14.4- and 28.8-Kbps service as we were finishing our story. We shared AOL's concern that if its testing dates slipped, we would erroneously report that AOL supported a higher access speed than it actually did. We decided to proceed cautiously and not report the higher speeds.—Ed.

I fully agree with your evaluation of AOL. I've tried other on-line services in the past and was unimpressed with their content, graphics, and speed; yet I've been impressed with AOL's content and ease of use. AOL really hit the spot for me. Your charts showed what I've known for a while: AOL is the best value in on-line services.

MIKE DUNLAP, via the Internet

After discovering that the toll-free sales number is the best way to terminate an account, I quit my AOL free trial this week without too much hassle. But when I asked to have my credit card number removed from AOL's records, it was a different story. I was referred to billing. After literally falling asleep while on hold waiting for a response, I was told that the credit card number would be retained indefinitely "for your own protection."

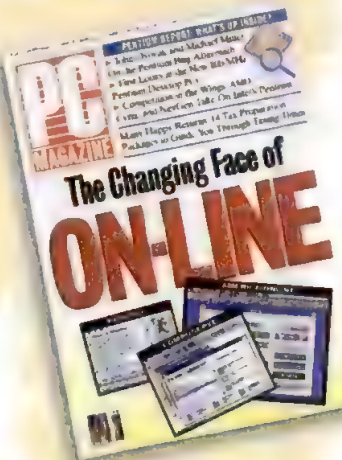
BOB MANN, via the Internet

Cancelling my AOL account took me over two months; AOL would not accept cancellations via its own e-mail. You must cancel by voice via an 800 number and pass your password over an open line. So much for account security. I'll stick with CompuServe.

JIM REID, via PC MagNet

As consumers, we have a powerful weapon against companies that don't deliver what they promise: our credit cards. In a dispute, simply write your credit card company explaining the problem and instruct them that you do not intend to honor the charge. Companies would rather give in than fight the credit card bureaucracy.

RON PLANK, via PC MagNet



Each service has its relative strengths and weaknesses, and each could stand improvement.

Today I had to try ten times to log on to AOL, and even then I only connected at 2,400 bps. Mail sent to me via the Internet took 36 hours to arrive; virtually the entire delay was at AOL. Although AOL is usually not this unreliable, it's going through major growing pains, and users cannot count on the service being available when they need it.

HARVEY MOTULSKY, via the Internet

For a home user such as myself, America Online is ideal, and I love it—on those rare occasions when it is accessible. But I've seen the service go from easy connectivity at any time of the day or night to being virtually impossible to reach at any time; after 7:00 P.M., you can simply forget it. Any effort to advise AOL of these difficulties results in a form message suggesting the problem lies with your equipment. Although your review noted AOL's exploding membership numbers, it failed to mention the adverse fallout from this boom.

BILL SPHA, via the Internet

AOL responds to the above criticisms:

We are aware that it has been difficult to access AOL in some cities. At AOL, we've been investing heavily in increasing network capacity and bringing higher-speed access to AOL through our new network, AOLNet. We strongly encourage members to try AOLNet, which provides high-speed access to members in more than 80 cities, with more cities to come. (Keyword: AOLNet will give you further details.) Also, our network provider, Sprint, has expanded its network coverage to include wider 9.6-Kbps access and to start 14.4-Kbps access.

For those wishing to cancel their AOL membership, there has always been an on-line option that guarantees immediate account cancellation (keyword: Cancel). AOL has recently hired hundreds of new support staff to service our growing membership. We're committed to customer service and will continue to improve our member support in the coming months.

One of the biggest advantages of text versus a graphical user interface is the speed with which you can interact with the system. AOL's graphical interface can really slow things down, while Delphi's text-based menus respond much faster. It's an advantage to which you didn't give enough credit.

H. MITCHELL, via the Internet

To state that AOL's graphical interface is "the best in the group" is a bit of a stretch. Having used both CompuServe (CIS) and AOL for a long time, I would say that each has its relative strengths and weakness, and both could stand some improvements. The edge you grant AOL seems based more on glitz than on the strength and depth of the information available to the user. AOL's graphics are attractive, but I find CIS's reach extremely useful.

JOHN F. PETERS, via PC MagNet

Kudos for an excellent issue. As a former user of CompuServe, I'm glad I switched to AOL. CIS is overpriced, overbloaded, and over-technical. I hope that CIS takes heed: Change your ways or get run over!

DAVE ROSS, via the Internet

AOL falls far below CompuServe in just about all areas, including on-line and off-line navigation, depth of information, and files and vendor support. Navigating through AOL is a pain in the mouse; CIS's forum layout of messages and libraries is much easier. And AOL's use of a screen name rather than a person's real name and user ID is confusing and unprofessional, especially considering some of the lame-brained screen names people choose. After all, how can you talk seriously to someone named RatBrain or BigGuy?

NEIL RUDISH, via the Internet

You rated CompuServe's mail service as being only fair, and yet in reality, it's not at all difficult to send mail to any user. It's only as hard as putting "INTERNET:" in front of an address. CompuServe mail is certainly not difficult enough to justify your rating.

JOHN KAZLAUSKAS, via PC MagNet

Although CompuServe's mail options are unrivaled, addressing mail can become quite complex depending on the system you're sending mail to.—Ed.



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Letters

Your impressive story on on-line services was enlightening. I look forward to reading future issues covering the ever-growing on-line world.

AIDAN STANLEY MARCUSS,
via the Internet

I fully enjoyed your coverage of on-line services. The article was very good and informative. Nice job!

GARY KIRKHAM, *via the Internet*

Your review left out two of the most important content improvements on Prodigy: the addition of uncut Associated Press stories and of Newsweek Interactive, which integrates photos and text on the same screen. For all its faults, Prodigy has an extremely stable system and helpful customer service.

D.W. DE CAMPO, *via the Internet*

Though your article about on-line services was generally solid and informative, I feel you gave GENie the short end of the stick. As a member of both AOL and GENie, I find that Aladdin (GENie's DOS-based front end) allows me to spend the same amount of time as I do on AOL for about \$10 a month less. GENie's Round Tables are far more organized than AOL's haphazard, chaotic groupings, and I've found that the discussions on GENie tend to be on a far more adult, mature level than those on AOL.

JEFF MORRIS, *via the Internet*

The cost of Dow Jones News/Retrieval may at first seem excessive. But considering its impressive resources and comparing its fees with the

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send submissions for PC Solutions, please see the sidebar "How to Contact Us" on the second page of that column.



CORRECTIONS AND AMPLIFICATIONS

A sidebar to our story "C++ Programming: Significant Development" (April 11, 1995) incorrectly reported that IBM's VisualAge C++ for Windows (a Windows-based successor to IBM C Set++ for OS/2) was scheduled to have shipped on the Microsoft Windows 95 platform by the issue's cover date. IBM has stated that a VisualAge C++ for Windows product will enter beta testing in 1995.

In our cover story on multimedia (March 28, 1995), the sidebar "20 Disks to Make Your Drive Spin" lists the wrong phone number for Discovery Communications. The correct phone number is 800-762-2189. In "Powered Speakers: Just Listen," another sidebar to that story, we inadvertently switched the photographs that appear on pages 196 and 197. The Acoustic Research Powered Partners 570, Altec Lansing ACS300.1, and Bose Acoustimass are shown on page 197; the Cambridge SoundWorks, AppleDesign Powered Speakers, and Altec Lansing ACS100.1 are shown on page 196.

In the First Looks review "Is That a Printer in Your Pocket? Pentax Redefines Portability" (March 28, 1995) we mistakenly reported the size of the Pentax PocketJet printer as being "nearly one-quarter the size of its closest rival, the Citizen Portable II." The Citizen printer, which is actually called the Citizen PN60, measures 2 by 10 by 1.9 inches (HWD), while the PocketJet measures 1.2 by 10 by 2.2 inches—roughly the same dimensions.

The correct title of a graphic accompanying the story "Four Paths to Messaging" (April 25, 1995) is "IBM WorkGroup," not "IBM GroupWare."

cost of subscribing to business publications, the service is a real bargain for serious investors.

OLIVER E. SEIKEL, *via the Internet*

Systems similar to PANIX can be found across the country and provide the best value in Internet access. Readers who want to get their feet wet at a low cost could do a lot worse than to find an inexpensive shell account and a copy of SlipKnot. I've found the Internet and the World-Wide Web to be far more interesting than any of the more costly on-line services.

TOM BETZ, *via the Internet*

After seeing your example search, I decided to attempt the same search on the Internet. I searched on *environment* using the Yahoo index (<http://akebono.stanford.edu/yahoo>) and got more than 400 hits. Most of them were misses, but several of them were real winners. The Internet lets you go right to many of the organizations that are actually working on the environment and get information directly from them in a way that no on-line service or public library can match. Therein lies the real power of the Internet.

J. PAUL HOLBROOK, *via the Internet*

The sidebar "Seven Ways to Save Time and Money On-Line" warns users about downloading large files, since they'll tie up your PC. I can download large files in the background and still write a letter, check my e-mail, or play mah-jongg. The difference? OS/2.

IAN SHERWOOD, *via the Internet*

Many thanks for your excellent article. But there's no mention of the fact that some services cannot be accessed outside the U.S.

DAVID LONG, *via the Internet*

International access may be considered as a criterion for our next on-line round-up.—Ed.

Those of us who live in rural areas continue to be faced with steep toll charges on top of the monthly fee for on-line services. I live in rural Iowa, and using these services opens many windows of opportunity for myself and my children. I'd like to see these services offer either an 800 number or more complete local access so that people who can maximize the advantages of an on-line connection the most can afford it.

JIM BABESHOFF, *via the Internet*

BIG BROTHER'S WATCHING

Bill Machrone's column "Compulsive Communicators" (February 21, 1995) is disturbing. If the phone company knows where you are all the time, can the government be far behind? And once the government can track the places you've been... Well, it's an invasion of privacy that should make us quite uncomfortable.

KEITH HANDLEY, *via the Internet*

I hope all the suffixes Machrone speculates on won't be implemented. What I don't need is more buttons to push on the phone or more check boxes to click in Windows. Attempts to contact customer support via interactive voice-response systems should give you a clue of how a good idea can go awry.

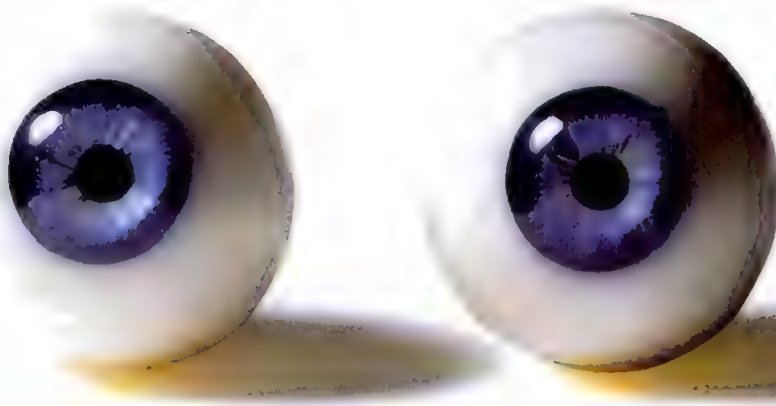
MARCEL KATES, *via the Internet*

DOOMING RESPONSIBILITY

I'm a 19-year-old who plays DOOM regularly (and so does my 12-year-old sister). You will find neither of us out shooting people or wreaking havoc on the general population just because we play DOOM. It's not games that influence a child's mind; it's their parents. My parents have instilled in me proper morals and the ability to determine wrong from right. Children who play violent games and follow them up with acts of violence do so because they were never taught the difference.

MATTHEW W. NITKA, *via the Internet*

SHOPPING FOR A 17" MONITOR? ENJOY THESE FABULOUS SAVINGS.



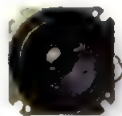
monitors — far surpassing the health and environmental criteria of MPRII and sparing your eyes the anguish of hours of staring into lesser systems.

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"If you stare into only one 17-inch screen this year, let it be Nokia's...", said the editors of *Home Office Computing*. Excellent advice, if you want to rub your eyes in astonishment — not irritation.



Even at first glance, the difference is clear.

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Whether it's the Nokia 447X professional caliber system (voted the Best Monitor of 1995*) or the multimedia 447L with built-in speakers

(which *HOC* Editors examined,) you'll enjoy unparalleled clarity.** At their maximum refresh rates, either can render images of near photographic stability. The longer you look, the

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innovations like the exclusive MicroEmission™ option and the anti-glare coating make these the world's most user-sensitive 17-inch

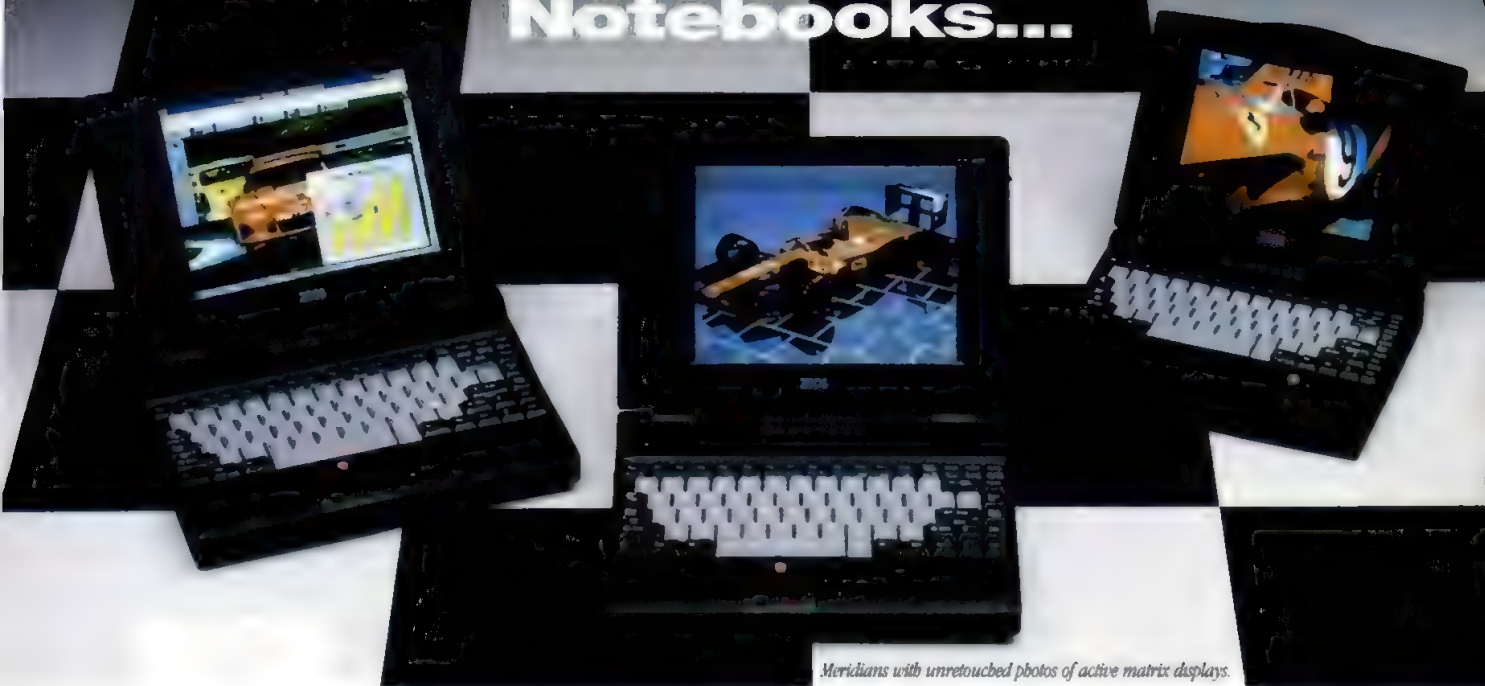


NOKIA
MONITORS



*PC Magazine, 1/95 **When used with an appropriate graphics card. 17" CRT yields a diagonal picture size of 15.5". Manufactured and designed in Finland in an ISO 9001 approved environment. Size of CRT measured diagonally. Actual viewing size is slightly less. © 1995, Nokia Display Products, Inc. Multigraph, Valuegraph, MicroEmission and FullScreen are trademarks of Nokia Display Products Inc. E-MAIL: bynokia@aol.com. Prices and specifications subject to change without notice. The Energy Star emblem does not represent EPA endorsement of any product or service. All other trademarks are the sole property of their respective companies.

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While each Meridian product is distinct, they all have several hot features that add to their impressive speed and ease of use including local bus video; a comfortable palm rest with an integrated TruePoint pointing device; and an 84-key keyboard.

Meridian 400 Subnotebook



"ZEOS is out to prove that good things do come in small packages with its Meridian 400C subnotebook," reported *Windows Magazine*.

At 3.9 pounds, the Meridian 400 subnotebook is molded from a special carbon-fiber material that cuts weight and improves durability. And with your choice of a 486DX2-50 or DX4-100 processor, hard drives to 350MB, and RAM that's user upgradable to 20MB, this notebook is "faster than a speeding desktop," as *Computer Shopper* said.

The 400 features active and dual-scan color screen options. You also

get two Type II PCMCIA slots and an external ultra-light 3.5" 1.44MB floppy drive (included in Packages 2 and 3).

Meridian 800 Notebook



"The 800C notebook offers sleek styling, solid construction and hot performance.... one of the fastest notebooks we've ever tested," said *Windows Magazine*.

At 6.3 pounds, the Meridian 800 full-size notebook is light enough to travel anywhere yet it's large enough to use for presentations and everyday computing. And with your choice of a 486DX2-50 or DX4-100 processor, removable hard drives to 528MB, and RAM that's user upgradable to 20MB, this notebook is the raciest thing around.

For your viewing pleasure, the 800 is available with your choice of color displays—a whopping 10.3" dual scan or 9.5" active. You also get two Type II or one Type III PCMCIA slots, and an internal 3.5" 1.44MB floppy drive.

Meridian 850 Pentium[®] Notebook

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For turbo power, the Meridian 850 comes with a Pentium-75 processor; 8 or 16MB RAM—user upgradable to 32MB—with 256K synchronous SRAM cache; and removable hard drives to 810MB. For the best viewing, the 850 is available with your choice of color displays—

a mammoth 10.3" (800 x 600) dual scan or 9.5" active matrix. You also get 16-bit stereo sound through audio jacks (Sound Blaster Pro compatible) for the best in portable multimedia, two Type II or one Type III PCMCIA slots, and an internal 3.5" 1.44MB floppy drive.

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	DX4-100	\$2395	\$2595	DX4-100	\$2695	\$2795	DX4-100	CNI \$2995	CNI \$3095
	Active Color	400A	800A	Active Color	400A	800A	Active Color	400A	800A
	486DX2-50	\$2695	\$2995	486DX2-50	CNI \$2995	\$3195	486DX2-50	CNI \$3295	CNI \$3495
	DX4-100	\$3095	\$3395	DX4-100	CNI \$3395	CNI \$3595	DX4-100	CNI \$3695	CNI \$3895
	➤ 4MB RAM ➤ 260MB IDE hard drive ➤ 800: Internal 3.5" 1.44MB floppy drive ➤ MS-DOS 6.2			➤ 8MB RAM ➤ 350MB IDE hard drive ➤ 3.5" 1.44MB floppy drive. 400: External, 800: Internal ➤ Custom nylon carrying case ➤ MS-DOS 6.2, Windows for Workgroups 3.11 ➤ Lotus Organizer			➤ 8MB RAM ➤ 350MB IDE hard drive (400), 528MB IDE hard drive (800) ➤ 3.5" 1.44MB floppy drive. 400: External, 800: Internal ➤ 14.4 PCMCIA fax/modem ➤ Custom carrying case. 400: Leather, 800: Nylon ➤ Extra battery ➤ MS-DOS 6.2, Windows for Workgroups 3.11 ➤ Lotus Organizer		

Pentium	Package 1		Package 2		Package 3	
	Dual Color	850C	Dual Color	850C	Dual Color	850C
	Pentium-75	\$3495	Pentium-75	CNI \$3995	Pentium-75	\$4395
	Active Color	850A	Active Color	850A	Active Color	850A
	Pentium-75	\$4295	Pentium-75	\$4795	Pentium-75	\$5195
	➤ 8MB RAM, 256K synchronous SRAM cache ➤ 528MB IDE hard drive ➤ Internal 3.5" 1.44MB floppy drive ➤ Integrated 16-bit stereo sound ➤ MS-DOS 6.2, Windows for Workgroups 3.11		➤ 16MB RAM, 256K synchronous SRAM cache ➤ 528MB IDE hard drive ➤ Internal 3.5" 1.44MB floppy drive ➤ Integrated 16-bit stereo sound ➤ Custom nylon carrying case ➤ Extra battery ➤ MS-DOS 6.2, Windows for Workgroups 3.11 ➤ Lotus Organizer		➤ 16MB RAM, 256K synchronous SRAM cache ➤ 810MB IDE hard drive ➤ Internal 3.5" 1.44MB floppy drive ➤ Integrated 16-bit stereo sound ➤ 14.4 PCMCIA fax/modem ➤ Custom nylon carrying case ➤ Extra battery ➤ MS-DOS 6.2, Windows for Workgroups 3.11 ➤ Lotus Organizer	

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Trends

TRENDS & TECHNOLOGY SHAPING THE PERSONAL COMPUTER MARKET

Taming the Text Tiger

Cutting-edge search tools beat browsing.

As Internet content and document databases expand exponentially, a pesky problem is arising: finding what you need. Like clumsy first-generation text-retrieval tools, browser-based searches and keyword searches suffer from two problems: They require you to know exactly what you're

looking for, and they leave you with a roiling sea of matches. Several players have been racing to control the flood of text with sophisticated retrieval technologies, including morphological language processing and linguistic analysis.

Traditional relevancy ranking, which ranks documents in order of the frequency and location of matching text, is now a dull-edged knife. The cutting-edge approach is to search for meaning within documents.

Verity Corp.'s Topic WebSearcher combines high-end text search engines with Mosaic, so you can search HTML pages flexibly and precisely. Its search engine first performs *expansions*, which analyze linguistic relationships and identify words directly and indirectly related to your search word. Other engines then perform morphological and fuzzy proximity analyses to determine how words are used. The final set of ranked documents includes documents you probably never would have known to search for.

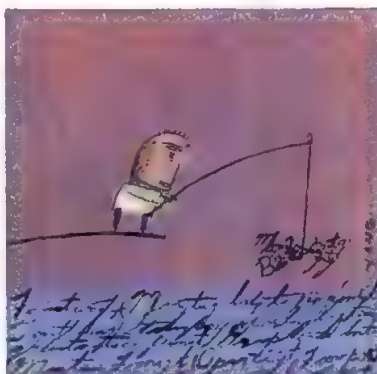
One problem with Verity's approach is that you must index the blocks of Web pages you want to search. Emerging text-retrieval tools can simplify that job, too. While it's nearly impossible to fully index the whole World-Wide Web, Open Text Corp., based in Waterloo, Ontario, maintains a text data-

base at <http://www.opentext.com> that indexes descriptors for much of the Web's content.

Morphological and linguistic analysis are not new, but performance enhancements mean they are just now heading for the PC in volume. Xerox's XLT technology, which can extrapolate searches to other languages, has been in development at Xerox's PARC research facility for 20 years. Xerox plans to announce partnerships with major on-line services later this year.

Oracle's ConText technology employs a 600,000-entry database of word relationships to retrieve text based on linguistic analysis. Its new TextServer 3 linguistically analyzes and searches large document databases. According to Oracle's Brett Newbold, ConText is now fast enough that it will appear in Windows products that Oracle plans to announce this summer.

Bruce Brown, who worked on Oracle's ConText technology and is now vice president of Folio Corp., is more skeptical that the PC platform is ready for cutting-edge relevancy ranking: "Linguistic and morphological analysis are incredible technologies, but only a year ago ConText was taking a minute per sentence on a SPARC workstation to analyze all its word relationships." —*Sebastian Rupley*



Display Crunch

COMBINE AN UNEXPECTED SURGE in demand with a natural disaster and an international monetary crisis, and you've got a shortage on your hands. That's exactly what's taking hold in the monitor industry, as tube (CRT) manufacturers can't keep up with demand from monitor vendors, the Kobe earthquake has slowed supplies in and out of Japan, and the dollar cost of goods imported from Japan is skyrocketing.

"The demand for glass tubes is increasing faster than we anticipated," says Tac Sugiyama, director of multimedia products marketing at Sony. Some vendors attribute the shortage to a surge in big-screen TV sales, which has prodded tube manufacturers to shift production to larger monitors, constraining the supply of 15- and 17-inch glass. According to Craig Sloss, Nanao's reseller manager, "The CRT is responsible for 50 percent of the cost of a monitor, and this year's shortage is going to jack up prices."

Meanwhile, the yen has been appreciating rapidly in the last year, while the dollar is declining, increasing the price of all goods imported from Japan.

The brunt of the increase had not hit consumers as of the spring. "It's still shaking out as to how much of an increase is going to be passed on to end users," says Rhoda Alexander of the market research firm Stanford Resources. Sony's Sugiyama and Nanao's Sloss expect the first crunch to show up in 15-inch monitors. "When the CRT vendors are faced with not enough glass to meet all the demand, the priority has to go to the most profitable tubes first, which are the larger-screen tubes," says Alexander.

Analysts have indicated that the shortage could be resolved by the third or fourth quarter, but how the situation plays out depends largely upon demand. Nanao's Sloss recommends buying now, but that strategy could backfire. "If the end user responds to an increase by backing off on purchase decisions, the shortage goes away and prices drop," says Alexander. "If the demand remains strong, then I expect the pricing to remain high and the shortage to continue into 1996." —*Carol Levin and Sebastian Rupley*

Pipeline By Robin Raskin

Microsoft, Keep Out!

Those of you who've heard me wag my tongue and seen me point my finger at today's sorry state of technical support know that I like to dream up high-tech solutions to the problem. For years, I've advocated the notion that tech support should use remote diagnostic tools and distributed databases to keep some record about me, my machine, and my support history. At a minimum, this would insure that each time I call for help, I won't feel like it's the first date all over again.

With Microsoft in on the act, though, my dream-come-true could quickly turn into a nightmare in the making. Microsoft's latest builds of the Windows 95 Preview come with on-line registration. You install the product, dial out via your modem, and register your copy. This isn't a new idea: Intel, Traveling Software, Datastorm, and others have used on-line registration for quite some time.



Microsoft goes two steps further. First, the number you dial to register is not some in-house BBS. It's an in-house BBS-on-steroids—Microsoft's new on-line service, Microsoft Network. Second, this is not uni-directional communication. MSN prowls around your hard disk, grabs your AUTOEXEC.BAT and CONFIG.SYS files, and asks permission to snoop around for information about your applications. The information gets stored in a customer database, ostensibly to help out when you call for tech support.

Does this make you feel a bit insecure? To be honest, my first reaction upon reading the on-screen message that MSN was

about to begin its sleuthing made me break out into a cold sweat and abort the process. My gut reaction was panic about the state of my hard disk. If this sounds a bit bourgeois I apologize, but I confess it was the same feeling I get before the maid comes in to clean. Do I really want anyone to see my house — or my hard disk — looking like this?

Obviously, I have the dubious distinction of Microsoft knowing who I am and taking a certain interest in my configuration. What would they think of a software reviewer whose most frequently used phrase in her AUTOEXEC.BAT file is REM, and whose path statement looks like the ultimate run-on sentence? I flashed on the potential for a Microsoft news release: *PC Mag Editor Sets Files and Buffers to Wrong Parameters.*

After spending an hour or so housecleaning, I still felt funny. If they couldn't embarrass me, what else could Microsoft do with the story of my PC life as told in my setup files?

I didn't have to let my imagination run wild to guess what they might do with a list of products I use. Could they start flooding me with mass mailings based on my system profile? Could they pass this information along or use it as leverage with other software developers? Could they use it to sell upgrades and product replacements on-line each time I logged onto the service?

The notion of having a company maintain a user profile in order to provide better service is a compelling one. After all, my airline knows where I like to sit and what I like to eat. On the other hand, I've seen the damage that a credit-card purchase can do as my collection of unsolicited gardening catalogs expands. Until I'm convinced that Microsoft won't use my system profile to make me feel more big-brothered than I am already, I've decided to remain anonymous. Let me know how you're going to play it.

Robin Raskin is editor of PC Magazine.

The ISDN Markup Battle

JUST WHEN ISDN WAS POISED FOR dramatic growth, a major roadblock has threatened to hold it back. Regional Bell companies, including Bell Atlantic and Pacific Bell, are squaring off with the Federal Communications Commission over the FCC's decision to dramatically increase subscriber line charges (SLCs) for ISDN lines. Both Bell Atlantic and Pacific Bell have filed petitions to waive the increases, but there are no signs that the FCC intends to budge. (See Bill Machrone's column "ISDN for the Masses? Not Quite.")

Analysts estimate that there are only about a half-million ISDN lines installed in the U.S. Installation costs and hassles, as well as high line charges, prevent more people from signing on. At the same time, ISDN's 64-Kbps communications technology is seen by many as the wind behind the next wave of communications technologies, including nationwide videoconferencing

and smoother Internet access.

The FCC has decided to change the fee structure for ISDN lines from per-ISDN-line billing to per-subscriber-line billing. Because an ISDN line's multiple channels can provide two phone lines, the FCC claims that each line is subject to billing. Critics argue that nobody buys an ISDN line in order to get two phone lines. The current SLC for an ISDN line is about \$3 per month.

The bottom line, according to Sandy McGreevy, regulatory manager at Pacific Bell, is that current users of ISDN lines can expect 50 to 100 percent increases in fees. "The FCC is burdening promising new technology with old rules," McGreevy says. She adds that the increases in line charges would result in costly changes to the billing systems phone companies use. Thousands of ISDN users have flooded Pacific Bell with messages protesting the FCC's decision (Pacific Bell is soliciting e-mail mes-

sages at FCCISDN@Policy.Net and delivering them to the chairman of the FCC).

There's no question that growth is being encouraged. According to GTE's Wayne McCallum, GTE had planned to boost its ISDN coverage to nearly all of its markets this year. Pacific Bell's CEO, Dave Dorman, recently announced a series of industry partnerships, distribution agreements, slight fee reductions, and products designed to spur ISDN growth. Pacific Bell is working with CompuServe, Intel, Microsoft, and 3Com on shrink-wrapped ISDN products, including an ISDN home product.

Telecommuting is also a trend targeted to boost the growth of ISDN. Pacific Bell's McGreevy points out that during California's recent string of natural disasters, ISDN-based telecommuting woke many corporations up to the benefits of the technology.

While the FCC has agreed to a rule that makes it easier for other Bells to oppose its decision, the decision looks final. The FCC declined to comment, but has emphasized that billing per phone line is nothing new. —Sebastian Rupley

Net Security Reawakening

THE CORPORATE NETWORK YOU manage is connected to the Internet and you suspect a security problem. What do you do? Report it to the Computer Emergency Response Team (CERT) Coordination Center. There, the incident analysis group will determine the magnitude of the threat and recommend a response, perhaps instituting one-time passwords or adding a logging program to track intrusions.

"We still find that the first time organizations start thinking about security is after an intrusion has occurred," says security expert Ed DeHart, who was part of the original CERT team that was founded just weeks after the Morris worm was unleashed on the Internet on November 3, 1988. In 1994, CERT handled over 2,000 incidents, which affected over 40,000 sites (half from a single attack); received over 3,000 hotline calls; published 15 security advisories; and received over 29,000 e-mail inquiries. "The best way to prepare for and respond to security incidents is to establish security policies that are enforceable and readable," says DeHart.

Good password practices are no longer

enough. Perimeter defenses such as firewalls are now a critical part of a secure network. In the 1980s, intruders exploited passwords, but today they've moved on to greater chal-

Security Resources

The Software Engineering Institute has a World-Wide Web home page that is located at <http://www.sei.cmu.edu> that carries CERT advisories, which provide information on how you can obtain a patch or details of a work-around for a security problem. They're also available via anonymous FTP from info.cert.org. To be added to the CERT mailing list, send mail to cert-advisory-request@cert.org. Usenet newsgroups that cover security issues include: comp.security.announce; comp.security.misc; alt.security; comp.risks; and comp.virus. You can get CERT contact information via a 24-hour telephone hotline for system administrators, 412-268-7090; by fax, 412-268-6989; or e-mail, cert@cert.org.

lenges: exploiting vulnerabilities in software such as SendMail to gain entry to host systems; exploiting protocols; installing sniffer programs; and installing back doors for future use. According to DeHart, "Intruders are examining source files for new security flaws. There's only so much you can do at the host level when protocols are flawed."

While unauthorized access to networks via the Internet remains a threat, progress is being made in another area of Internet security: transaction security. And once technology can assuage consumers' concerns about using credit cards on the Internet, electronic commerce is expected to take off.

Major industry players recently agreed on a universal approach to secure transactions over the World-Wide Web. America Online, CompuServe, IBM, Netscape, and Prodigy are now supporting Secure HTTP, a protocol based on RSA public key cryptography for scrambling and unscrambling information. "Encryption is to secure software as internal combustion is to cars," says Allan Schiffman, the designer of Secure HTTP and chief technical officer at Terisa Systems. Cracking RSA is a "practical impossibility" says Schiffman. "If it would merely take a few million years, then we'd be worried."—Carol Levin

Satan: Good or Evil?

IN APRIL, WHEN THE INTERNET security and snooping software Satan (short for Security Administrator Tool for Analyzing Networks) became available for free on the Internet, a clearer picture emerged of how radically the unmanaged Internet differs from actively managed networks. Instead of the widespread Net break-ins it was supposed to usher in, Satan's availability appears to have functioned much more as the program's co-author, Dan Farmer, said it would: as a wake-up call. For some of the players aiming to leverage the Internet as a platform for electronic commerce and other applications that put a premium on security, Satan has brought the Net's risks into clearer focus.



more as the program's co-author, Dan Farmer, said it would: as a wake-up call. For some of the players aiming to leverage the Internet as a

Satan is a double-edged sword. The software helps network administrators by identifying holes in security—while at the same time letting hackers exploit the program's information on how to infiltrate those holes. Critics argue that Satan is an easy invitation to hackers to snoop where they don't belong. Indeed, there have

already been reports of unauthorized Satan snoop jobs at several sites, including Chicago's DomiNet and Clear Lake's Phoenix Data Systems.

Others, though, argue that any site that puts a premium on security will have an experienced network manager in charge, and that only very green network managers could fall prey to the collection of widely known hacking recipes that Satan collects.

Dan Farmer, who was fired by Silicon Graphics Inc. over the company's disagreement with his intention to distribute Satan freely on the Internet and has expressed fear that legal action may be taken against him, says that Satan "will improve Internet security" by forcing administrators to address security lapses. Farmer has already used Satan to help several prominent corporations, including AT&T and J.P. Morgan, patch security holes.

An official at RSA Data Security in Redwood City, California, who asked to remain anonymous, disagrees: "You could easily write a little script to get Satan to go out and probe hundreds of sites while you take in a movie. It's the digital version of the Anarchist's Cookbook, and you can automate it."

Network administrators are advised to run Satan to identify holes in their own security systems. Software that foils unauthorized Satan-based snooping is also available for downloading off the Internet. The most popular such program is Courtney, developed at California's Lawrence Livermore

How to Get the Software

Satan is available in a number of places on the Internet. Here are some of the sites:

- [ftp.win.tue.nl/pub/security/admin-guide-to-cracking.Z](ftp://win.tue.nl/pub/security/admin-guide-to-cracking.Z)
- [ftp.demon.co.uk/pub/mirrors/satan/](ftp://demon.co.uk/pub/mirrors/satan/)
- [ftp.lerc.nasa.gov/security/](ftp://lerc.nasa.gov/security/)

How to get Courtney:

- <http://ciac.llnl.gov/ciac/ToolsUnix/NetMon.html#Courtney>

Laboratory, which can alert the network manager to the system that launched the attack.

For the latest Satan developments, along with related discussion groups and news, visit *PC Magazine's Trends Online* at <http://www.ziff.com~pcmag>.

—Sebastian Rupley

Putting the "Space" In Cyberspace

VIRTUAL REALITY IS STAKING ITS claim on the World-Wide Web, and it promises to make today's graphical user interfaces as obsolete as the command line.

Imagine logging onto a home page on the Web as you usually do. You click on Adventure in Travel and your view of graphics and text is replaced with a 3-D scene of a travel agent's office. Navigational controls move you forward, backward, left, right, up, and down. As you move in to take a closer look at a poster of a posh resort, you find yourself catapulted to that very destination, complete with gurgling fountain and swaying palms. This is the Web in 3-D.

The technology behind such an experience works like this: Your Web browser, say Netscape Navigator, is configured to trigger a helper application under certain conditions, much as audio and video players are configured. By choosing a Web address that has 3-D content, you automatically launch a 3-D browser on your computer. The server

downloads a specially formatted ASCII file (a 3-D world description file) that the browser interprets.

Once you're in the 3-D home world, clicking on hot spots triggers downloads from the same server or from a server in a different location. To reduce the time delay as you switch locations, the 3-D Web world description files are smaller than many of the bitmaps that shuttle across the Web today.

Several Web virtual reality projects are underway. VRML 1.0 (Virtual Reality Modeling Language) is a subset of the Open Inventor file format pioneered by Silicon Graphics Inc. As an open, published standard, VRML is serving as the basis for commercial 3-D browsers, authoring tools, and content.

WebSpace—a 3-D browser based on



UB Networks' worlds offer interactive avatars.

VRML and the OpenGL rendering language—is the offspring of a partnership between SGI and Template Graphics Software (TGS) of San Diego. TGS also offers Open Inventor as a cross-platform toolkit for programming VRML worlds and custom browsers. SceneCreator, due in June from TGS, is designed to let nonprogrammers create their own VRML worlds.

Other developers are also spearheading

Enter a 3-D World

WebSpace is available at <http://www.sd.tgs.com/~template>. Links to many 3-D Web Worlds can be found at <http://www.sgi.com>. You can also experience a 3-D Web World in Trends Online at <http://www.ziff.com~pcmag>.

development of 3-D Web worlds. Intervista of San Francisco, an offshoot of The Community Company founded by Mark Pesce, the father of the VRML movement, is at work on Worldview. This VRML browser differentiates itself by rendering worlds with RenderMorphics' RealityLab, recently acquired by Microsoft.

VREAM, based in Chicago, has developed WebView, a browser that interprets



WebView puts virtual reality on the Web.

VRML worlds as well as worlds created with the company's VRCreator virtual reality software, currently in beta. At the heart of a VREAM world is the scripting language VST, which enables user interactions to be linked easily with world behaviors. VREAM plans to offer a range of tools for both world consumers and programmers.

UB Networks, formerly Ungerman Bass, is taking a different 3-D road to the Web. Based on its primary business of producing industrial strength networks, UB Networks is seeking to provide robust, fault-tolerant 3-D worlds in turnkey form to organizations.

All real-time 3-D graphics are subject to a tradeoff between graphics quality and interactivity. While most developers are focusing on graphics quality, UB Networks is choosing high levels of interactivity. Upon entering a UB World, you select an avatar—an animated 3-D humanoid figure—to be your virtual self. As you explore, you may encounter other avatars that represent other users on-line. You can even stop and chat with them by typing.

Beyond CAD models, product designs, and 3-D depictions of travel destinations, there's a realm of data and knowledge that can be communicated only through three-dimensional metaphors and experiences. —Linda and Erick Von Schweber



Silicon Graphics' WebSpace is based on VRML.

Top Retail Software

Current ranking	Last issue	Product/company
1	6	Procomm Plus for Windows 2.11 Datastorm Technologies Inc.
2	3	MS-DOS 6.22 Upgrade Microsoft Corp.
3	—	CheckIt Setup Advisor 2.0 TouchStone Software Corp.
4	5	WinFax PRO 4.0 Delrina Technology
5	8	CorelGallery 1.0 Corel Corp.
6	10	QEMM 7.5 Quarterdeck Office Systems
7	—	MS Office 4.2 for Windows Microsoft Corp.
8	4	WordPerfect 6.1 for Windows Upgrade Novell Inc.
9	—	Internet-In-a-Box SPRY Inc.
10	—	WinCheckIt 2.0 TouchStone Software Corp.

This list ranks PC business programs according to the total number of copies shipped to over 12,000 stores and resellers in the week ending April 8, 1995; the list cannot be interpreted as a picture of the entire software market. Adapted from a compilation by Ingram Micro.



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Printer

Control Panel

Page Control

Page S

Status

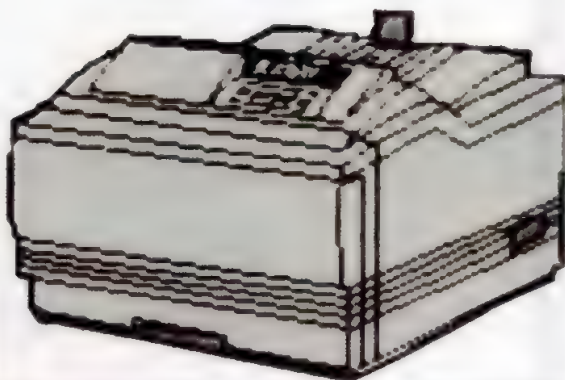
Model



HP LaserJet

Printer Description

This HP LaserJet copy room. If you problems with the Haines at 555-121



Online

Control Panel 00 READY

OK

Cancel

Help

Capabilities



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First Looks

HANDS-ON REVIEWS OF NEW SHIPPING PRODUCTS

INTERNET AUTHORING

HTML Add-Ons Bring the Power of the Internet to Word for Windows

By Edward Mendelson

If you want to get your message out on the World-Wide Web, you need an editor to create pages in the Web's standard Hypertext Markup Language, commonly known as HTML. You can use an ordinary text editor and wrestle with HTML codes by hand, or you can take the time to learn a special-purpose HTML editor such as SoftQuad's powerful \$195 HoTMetaL Pro. But if, like most people, you feel most comfortable creating documents in your word processor, you'll want to explore HTML add-ons such as Quarterdeck Corp.'s \$149.95 WebAuthor for Word for Windows or Microsoft's no-charge Microsoft Internet Assistant, Version 1.0.

Both programs let you create HTML files for Web pages using the familiar tools and interface of



IMAGE CONSCIOUS: WebAuthor can easily accommodate the inclusion of graphics in the HTML documents it produces.

Microsoft Word 6.0 for Windows without learning—or even seeing—HTML codes. For basic

Web-page authoring, Microsoft's free Internet Assistant is the online ticket. Internet Assistant in-

cludes a built-in Web browser that uses Word as its viewing screen, so you can cut-and-paste from a Web page a continent away to a page you create on your computer and link your page to remote pages.

When you move up to advanced HTML features, like complex forms with radio buttons, WebAuthor automates the job for you; Internet Assistant forces you to edit obscure codes by hand. WebAuthor also parses your HTML files for syntax errors, and unlike Internet Assistant, it won't let you create a document without entering the title field required by all browsers.

WEBAUTHOR

When you start WebAuthor from Word's Tools menu, the program asks if you want to create a new HTML file, import an existing one, or open a Word document that you worked on in an earlier WebAuthor session. Inconveniently, if you want to use an existing Word document as the basis for a new HTML file, you have to export it as an ASCII file first.

Continues on page 38

DIGITAL PHOTOGRAPHY

Kodak DC-40: The Ultimate in PC Instant Photography

By Daniel Grotta & Sally Wiener Grotta

The second generation of filmless cameras has arrived, and out in front of the pack is the Kodak Digital Camera 40. The ultimate in instant photographic gratification, the DC-40 produces 24-bit digital color images of surprising quality and richness in a matter of seconds.

While it can't compete with professional digital cameras like the Kodak DCS-420, which uses a Nikon N90 body and costs more than ten times as much (First Looks, December 6, 1994), it is a rung up the evolutionary ladder from the first digital cameras. The \$995 DC-40 is an excellent way to quickly capture a mug shot for the

corporate organizational chart or a photo of headquarters for a newsletter.

The DC-40 is a compact, 1 pound 5 ounce point-and-shoot camera with a fixed-focus f2.8 lens, an automatic light meter, shutter speeds between 1/30 and 1/175 of a second, and a built-in strobe. Unlike most conventional 35-mm cameras, you can control neither the lens's aperture nor its shutter speed, but you can choose among low- or high-resolution photos, exposure compensation, or the ability to erase pictures.

With a strap on the right side, the DC-40 feels comfortable in

the hand (that is, if you're right-handed). Taking a digital photo is much like using a conventional point-and-shoot camera: Simply aim and press the shutter release. The camera does the rest.

However, because it takes nearly a second to activate the shutter, you're never certain



DIGITAL EYE: Kodak's DC-40 has a liquid crystal display to show the digital camera's major functions.

exactly when you've actually taken the picture. This makes it tough to get the shot you want with a fast-moving subject. Also,

Continues on page 39

IN FIRST LOOKS

Compaq Presario CDS 774	40
HP LaserJet 5MP	42
KPT Convolver	44
Tek Illustrator 3	44
NeuralWorks Predict	46
FlowModel	46
Astound 2.0 for Windows	48
Manage Pro 3.0 for Windows	48
QMS magicolor LX	50
Canon BJC-70	51
HP Colorado T1000	52
Math Office	52
DPT SmartRaid	54
Pinnacle Micro RCD-1000	54
ACT! Mobile Link 2.0	56
CardWizard Pro	56
CD Cabin	56

First Looks

HTML Add-Ons

Continued from page 37

The program then installs a special toolbar and prompts you to enter a title for any new HTML file you create. From that point on, you work more or less as you would in Word.

One major exception is that WebAuthor won't let you use any of Word's paragraph or character styles. If you try to boldface a word using Ctrl-B or the toolbar's Bold icon, the word will appear in bold on screen—but the bold formatting will be ignored when WebAuthor produces the final HTML file.

All formatting—even bold and italic—is entered from a pop-up window that offers a list of acceptable HTML styles, and you won't find any keyboard shortcuts for selecting them. HTML purists disapprove of typographic format names such as bold and italic, preferring functional names such as emphasis and strong, but that's not a good enough reason to ignore Word's built-in bold and italic character styles.

WebAuthor inserts hypertext links to files via a dialog box that lists files on your disk, as well as the Uniform Resource Locators (URLs) of files on the Internet that you've entered into an address book. This streamlines linking documents, but you can't test the links until you open the file in a Web browser. When you click on a link in WebAuthor, it brings up a dialog box that tells you where the jump is supposed to take you, but it doesn't check whether the destination file or URL actually exists.

Lists, linked graphics, and fill-in forms complete with radio buttons and other advanced features can be created through a series of clearly arranged dialog boxes. But once you've created a fill-in form, WebAuthor doesn't help you insert the needed HTML code specifying the actions to be performed when data is entered. The manual simply refers you to the system administrator. When it's time to save a file, WebAuthor checks it for conformity with the HTML 2.0 specification.

WebAuthor 1.0 suffers from minor glitches. Importing even

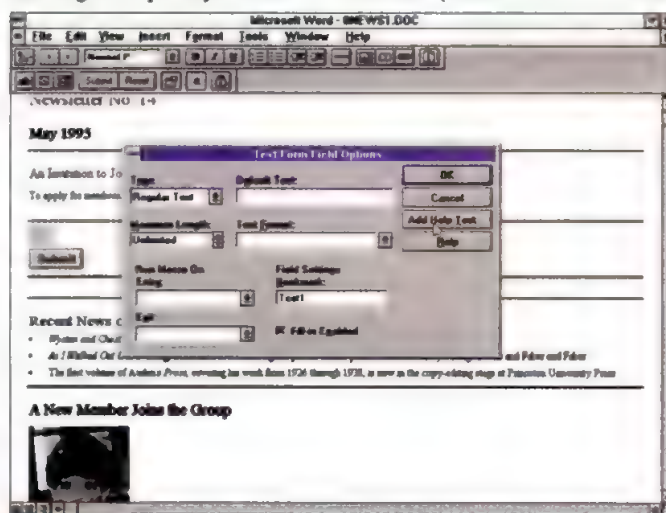
small HTML files is agonizingly slow. When you try to edit the title field or text near radio buttons, you may find that you can't delete characters or that characters appear in a symbol font instead of as text. Quarterdeck plans upgrades with powerful file-conversion features and, eventually, integration with the company's Mosaic browser.

Despite the rough edges, WebAuthor is an ambitious start at bringing HTML into the world of everyday word processing.

INTERNET ASSISTANT

Microsoft Internet Assistant relies more on the structure of Word for Windows than does WebAuthor, but sacrifices WebAuthor's ability to produce complex pages with ease.

Internet Assistant, which you can download from Microsoft's Web site (<http://www.microsoft.com>) or order on disk for \$5, comes with a help file and a readme document. At this price, don't expect technical support. Though the help file includes a screen headed "Technical Support," the screen beneath the heading is eloquently blank.



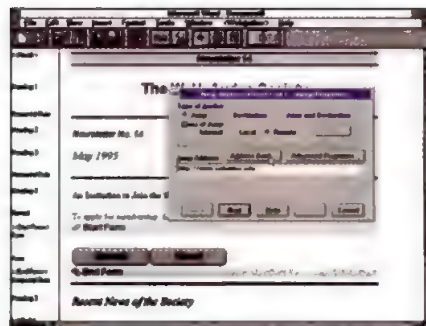
IRRELEVANT: Internet Assistant uses Word for Windows' standard Text Form Field dialog box for creating HTML forms.

You start Internet Assistant by clicking on an icon in Word's formatting toolbar or by choosing Browse Web from the File menu. This takes you to a home page that you can use for access to help screens or for jumping to the Internet itself. You then create a new HTML file with Word's

File/New menu choice.

Internet Assistant lets you use Word's standard character and paragraph formatting. If you're familiar with Word, you're likely to be more comfortable with Internet Assistant than with WebAuthor. Hypertext destinations are recorded using Word's standard bookmark feature, and links are accomplished via a well-designed tabbed-dialog box. When you use Internet Assistant as a Web browser, you create links to remote files with a few menu-driven keystrokes. Unlike WebAuthor, Internet Assistant actually verifies the link.

Internet Assistant is weakest in its support for HTML features that can't easily be mapped to Word. For example, when we created a set of radio buttons, we had to pay close attention to the help screens while typing what seemed to be arbitrary characters in an un-intuitive dialog box. WebAuthor, on the other hand, is weakest in its support for standard formatting features (where it uses its own dia-



STYLISH: WebAuthor uses a nonstandard dialog box instead of Word's formatting.

verse relation of two linked documents. Internet Assistant and WebAuthor both support only the HTML 2.0 spec, but WebAuthor at least displays the wording of tags it doesn't recognize. Internet Assistant, however, displays any tag from HTML 3.0 or the Netscape HTML extensions as an "unknown tag."

Considered as a Web browser, Internet Assistant is nothing to e-mail home about. The browser uses technology licensed from InternetWorks and frequently fails to load files that give other browsers no trouble at all. The browser consistently caused a General Protection Fault in Microsoft's .GIF converter when downloading images from PC Magazine's home page.

But none of these problems detract from the unique integration of Internet Assistant's authoring and browsing functions into Word. The culture of the Internet has produced some superb programs that are available for no charge, and Internet Assistant stands among the best of them.

Internet Assistant, Version 1.0. List price: Free via Internet download; disks and documentation, \$5. Requires: 6MB RAM, 2MB hard disk space, Microsoft Word 6.0 for Windows (16-bit version only), Microsoft Windows 3.1 or later. Microsoft Corp., Redmond WA; 800-360-7561, 206-882-8080.

Circle 435 on reader service card

WebAuthor for Word for Windows. List price: \$149.95. Requires: 4MB RAM, 1MB hard disk space, Microsoft Word 6.0 for Windows, Microsoft Windows 3.1 or later. Quarterdeck Corp., Santa Monica CA; 800-354-2834, 310-392-9851; fax, 310-314-4217.

Circle 436 on reader service card

Digital Cameras

Continued from page 37

because the data must be saved digitally to the camera's memory chips, it takes approximately 9 seconds for the DC-40 to reset for the next shot.

There is one unexpected welcome feature of the DC-40: The LCD panel in the rear gives a countdown of the number of shots you have left. Once exposed, images will remain intact in memory for about a year, even without batteries. It's also possible to delete that last, messed-up shot, or completely erase the buffer and start over with the electronic equivalent of a fresh roll of film.

Moving images to the PC is done through the camera's built-

in high-speed serial port. Kodak provides a serial cable and both a Twain driver and a standalone Windows program called Photo-Enhancer. With a throughput of 115 kilobits per second, it takes about 17 seconds to upload and decompress a typical image (which can be saved as a TIFF or .BMP file).

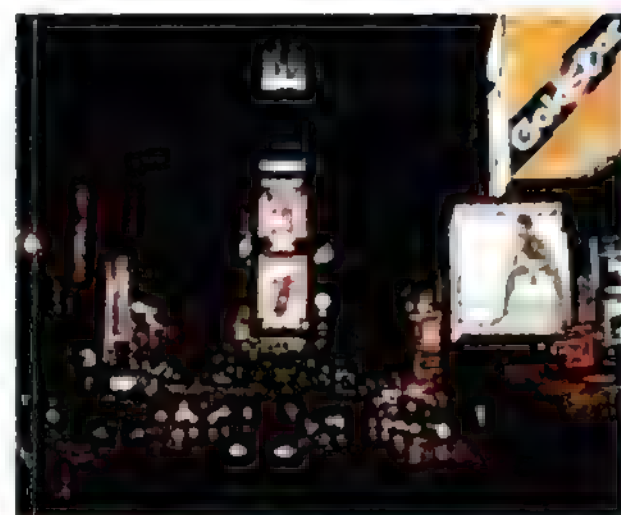
A few words of advice about digital photography in general and the DC-40 in particular: Use a PC with a high-speed serial port or you'll spend a lot of time during image transfers. With an older PC that had an 8250 UART serial port, moving a test image took 2 minutes 30 seconds, compared with about 20 seconds with a 16550 UART.

The DC-40's lens captures everything in focus from 4 feet to

infinity, and there is no way to manually adjust the camera's aperture. A 37-millimeter screw thread around the lens will accommodate optical-quality glass closeup, telephoto, and wide-angle auxiliary lenses that Tiffen, a major manufacturer of photo products, plans to market.

CAMERA COUSINS

The Kodak DC-40 bears a striking resemblance to Apple's QuickTake 150 digital camera (see the sidebar "QuickTake 150 Balances Pixels and Price"). The lenses, bodies, and basic electronics of both devices are manufactured by Japan's Chinon, while Kodak makes the charge coupled device (CCD)



BRIGHT LIGHTS: The DC-40 produces rich photos under high contrast situations.

imaging target and assembles both cameras.

The main difference is that the DC-40 uses the entire CCD surface to produce 756- by 504-pixel resolution versus the QT-150's 640- by 480-pixel view of the world. That translates into 27 percent more visual data, but requires about 1.1MB of uncompressed space for each DC-40 image—versus about 800K per image for the QT-150. And because the DC-40 comes with 4MB of flash EPROM memory—four times as much as the QT-150—it can record a total of 48 standard-resolution and 96 low-resolution shots, compared with the QT-150's capacity of 16 and 32 images, respectively.

POWER HUNGRY

The DC-40 operates on four AA lithium or nickel cadmium batteries, which are good for up to 900 shots. Offloading images takes a lot of power, which will drain the batteries quicker; Kodak sells an optional AC adapter.

What impressed us most was the quality of the DC-40's images. They were sharper and more detailed than those produced by digital cameras that cost up to four times as much. Even in low-light situations, the built-in light meter compensated and produced photos of stunning richness.

High resolution, light weight and a reasonable price tag make Kodak's DC-40 a leader in digital photography.

Digital Camera 40. List price: \$995. Requires: 4MB RAM, DOS 3.3 or later, Microsoft Windows 3.1 or later. Eastman Kodak Co., Rochester, NY; 800-235-6325; email: <http://www.kodak.com>. Circle 433 on reader service card

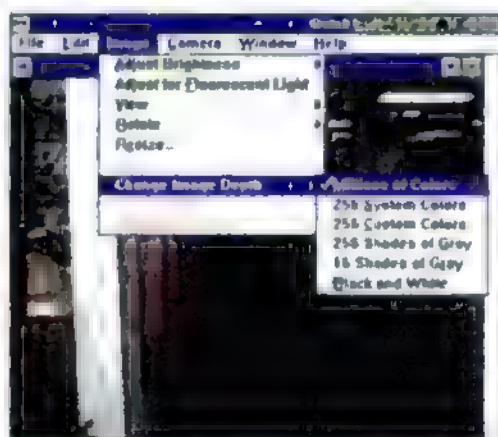
QuickTake 150 Balances Pixels and Price

While the similarities between the Kodak DC-40 and Apple's QuickTake 150 abound, the QuickTake 150 sacrifices a little resolution and capacity for a digital camera that is lighter, less expensive, and integrates better with the Macintosh.

At \$739, the Windows-version of QT-150 is a less expensive alternative that produces crisp, clear, detailed images. Side-by-side, the images from the two cameras look similar, although there are visible scan lines in the QT-150's 640-by-480 resolution output.

Weighing in at less than a pound, the QT-150 has a sleek, curved Euro design, which stands in contrast to the boxy DC-40. While you'll have to remove a rubber cover on the DC-40 to get to the serial connection, the QT-150 has a convenient fold-away door. Holding three AA batteries (to the DC-40's four), the QT-150 can shoot only about 200 photos on a set of cells, compared with the DC-40's 900. Apple sells an optional AC adapter, as well as an 8-cell auxiliary battery pack.

There are two areas where the QT-150 surpasses the DC-40. First, the package comes with a snap-on close-up lens that includes a flash dif-



ADJUST: Post-exposure processing possibilities include color-depth correction.



VIBRANT: QuickTake images are clear, detailed, and rich in color.

fuser and a compensator for the viewfinder. Good for shots between 8 and 14 inches, we found that it worked well for producing pictures of small items such as stamps, jewelry, or electronic parts. It also worked passably well as a copy camera.

While the Windows-based PictureWorks! is comparable to the Kodak software in features and ease of use, when the Macintosh version is used, the QuickTake's

possibilities increase. The system can transfer images to the Macintosh's GeoPort serial connection up to seven times faster than the PC. The software package also includes the ColorSync color-matching system, which takes the guesswork out of resolving the differences in image color between monitor and printer.

Regardless of the platform, the QuickTake 150 lets you say goodbye to film and processing by producing instant high-quality photographs the digital way.—*Brian Nadel*

QuickTake 150. List price: \$739. Requires: 2MB RAM, 10MB hard disk space, Microsoft Windows 3.1 or later. Apple Computer Inc., Cupertino, CA; 408-996-1010.

Circle 434 on reader service card

HOME PCs

Compaq Adds Pentium Muscle to the Presario Lineup

By Bill Howard

The Compaq Presario has always been the home/SOHO line of PCs you could safely recommend to your computer-novice neighbors. If performance wasn't cutting edge, the all-486 lineup contained no fatal flaws that might force you to spend several evenings with your neighbor trying to get one of these systems up and running. With its late-spring release of a dozen new models, Compaq Computer Corp. has boosted the line's processing power enough so that you'd feel comfortable having a Presario in your house, as well.

With the new Presarios, Compaq now has a home-oriented line of PCs that can go head-to-head with the likes of Packard Bell and Acer America in terms of features and performance. For starters, the majority of Presario systems contain Pentium CPUs or—as Compaq says on the box—"586 processing power." This is more than a matter of semantics, because Intel's CPUs are placeholders until NexGen and AMD can bring their Pentium-class CPUs on-line. Regardless of where the processors come from, the result is that Compaq has what may be the best-rounded line of PCs available for the rapidly-expanding home market.

PENTIUM PRESARIO

PC Magazine Labs tested the Compaq Presario CDS 774, a desktop system equipped with a 75-MHz Pentium processor, 8MB of RAM, a 696MB hard disk, a quad-speed CD-ROM drive, a 14.4-kilobit-per-second fax modem, a 14-inch monitor, and monitor-mounted speakers. Compaq estimates the system will sell for \$2,498 (\$100 more with a 15-inch monitor), although we think aggressive dealers will bring the price down to under \$2,300. The Presario line ranges from an entry-level AMD 486DX2/66 to a Pentium/100 power system.

The stylish, two-tone, 700-series Presario desktop unit had

two shared PCI/ISA slots, two ISA-only slots, and four drive bays. If you need more room, the 900-series mini-tower units each add a fifth slot and fifth drive bay for \$50 more. If you want an all-in-one unit, take a look at systems in the 486-only 500 series.



PUMPING UP PC POWER: Compaq puts more zip into its Presario line of PCs. Icons (below) on the system's back identify connections.



The Presario we looked at attained a score of 77 on our Winstone 95 application test, which is a good measure of all-around Windows performance. Among the nine 60-MHz to 90-MHz Pentium home systems we recently reviewed ("A Pentium for Every Home," May 16, 1995), the Presario would have been above the average, and in third place, behind two Pentium/90 systems from Micron Computer and NEC Technologies. The Presario would have been ahead of the similarly equipped Gateway 2000 P5-75 Family PC by a slim margin. In terms of DOSMark performance—indicative of how fast games will run on a PC—the Presario was above average, but this time just behind the Gateway 2000 PC.

There are several features that separate the new Presarios from the pack of home PCs (as well as from earlier Compaq efforts). Quad-speed CD-ROM drives are

standard on all Presario models. Gone is the silly half-hour Windows installation routine you had to perform on older Presarios; all software comes preloaded. The Presario, which includes an iconic back panel identifying all ports and connections, now runs right out of the box. A backup CD containing DOS and Windows is included in the event of a hard disk failure. Previously, Compaq did not include any system disks—floppy or CD.

The software count continues to edge upward toward industry leader Packard Bell Electronics' 27 titles. Compaq has 25, including Microsoft Encarta, Microsoft Works, Reuters Money Network, Intuit's Quicken, and start-up packages from the big-three online services (America Online, CompuServe, and Prodigy).

Compaq's Presario has integrated telephony more than any other line of home-oriented PCs. Full-duplex speakerphone and telephone answering-machine capabilities are included and use the speakers mounted on the lower front corners of the monitor. You can configure the system to have up to 10 individual password-protected voice-mail boxes.

The Presario breaks new ground in terms of building a television set into the PC case as well. While not reviewed here, the Presario CDTV 978 is similar to the system we looked at, except it is housed in a mini-tower case and contains a TV tuner card that

brings broadcast television to the desktop. The problem is that, except as a second—or third—television, the PC-TV approach doesn't work well because of the small monitor used.

BENT-NECK SOFTWARE

Compaq, unfortunately, continues to use TabWorks as its Windows front end. TabWorks uses side-tabbed folders to hold your applications, forcing you to cock your head 90 degrees to read the folder names. Compaq hints that TabWorks may be phased out, however.

Every Presario has a setup videotape, nonthreatening how-to pamphlets (no thick manuals), a three-year warranty, around-the-clock phone support, and remote diagnostics. And keep in mind that Compaq had the highest rating on *PC Magazine's* most recent Service and Reliability survey.

With good performance and features, the Presario has only one real downside: You can get the same feature set and performance from other vendors such as Acer America Corp., Gateway 2000, and Packard Bell for \$300 to \$400 less.

For now, however, the Presario remains a good value and possibly the best buy if you want an irreproachable name on your computer.

Compaq Presario CDS 774. Estimated street price: With Pentium/75 CPU, 8MB RAM, 696MB hard disk, 14-inch monitor, quad-speed CD-ROM drive, \$2,498. Compaq Computer Corp., Houston, TX; 800-345-1518; fax, 713-378-1442.

Circle 429 on reader service card

BENCHMARK TESTS

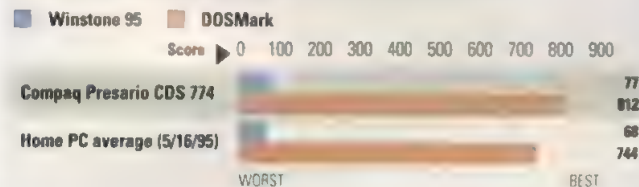


COMPAQ PRESARIO CDS 774

The latest addition to Compaq Computer Corp.'s home-oriented Presario line was slightly ahead of the pace set by the nine home PCs reviewed in our

issue of May 16, 1995

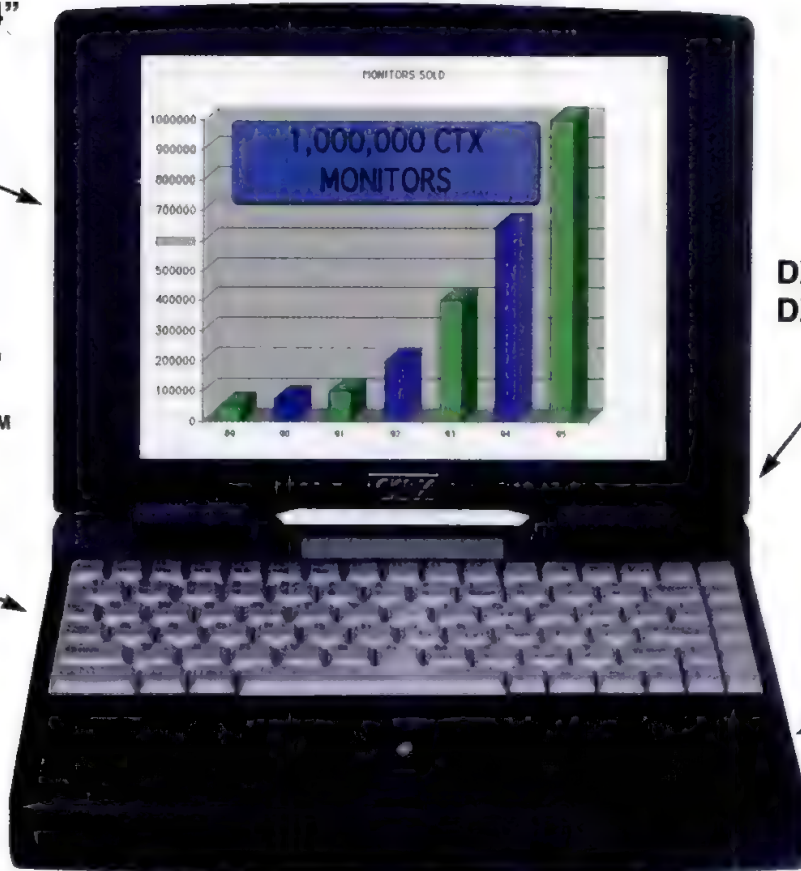
The Compaq Presario CDS 774 was equipped with a Pentium/75 CPU, 8MB of RAM, 256K of external cache, and a quad-speed CD-ROM



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CIRCLE 267 ON READER SERVICE CARD

LASER PRINTERS

HP's LaserJet 5 Frees You from Printer Cables

By Edward Mendelson

Hewlett-Packard's 6-page-per-minute (ppm), 600-dot-per-inch LaserJet 5P and 5MP desktop laser printers free you from a tangle of cables by letting you print wirelessly, provided your computer has an infrared port. The \$1,109 5P (with PCL 5 printer language) and \$1,299 5MP (with PCL 5 and Adobe PostScript Level 2) come with an infrared window on the front, plus two bidirectional parallel ports.

The 5P and 5MP rank as HP's personal and small-workgroup printers. The connection possibilities include hooking up two PCs to the printer's B- and C-type parallel ports, and a Macintosh via the printer's LocalTalk port. The 5-series LaserJet switches automatically among the ports seamlessly and accepts infrared print jobs on demand.

Weighing in at 24 pounds 8 ounces, the LaserJet 5P and 5MP each have a compact 15.8-by-17.5-inch footprint. The larger 12-ppm LaserJet 4+ and 4M+ remain a step up in HP's product line, with the 16-ppm, 11-by-17-inch 4V and 4MV models at the highest point.

HOMEOWNED EFFORT

The 5P and 5MP, unlike their discontinued 4P and 4MP predecessors, use an HP-built engine and a 20-MHz Motorola RISC processor. The new design is rated at 6 ppm and replaces the 4-ppm Canon engine and Intel processor in earlier models. In PC Magazine Labs' testing, the 5MP started printing about 25 seconds after the power was switched on, and printed text at 5.9 ppm at both 300- and 600-dot-per-inch resolution; PCL graphics printed at 1.9 graphic pages per minute at 300 dpi and at 1.8 gppm at 600 dpi.

The infrared port, which meets the IrDA specification that is rapidly becoming the wireless printing standard, moved data to the printer slower than the paral-

lel port, but otherwise produced similar results. When printing a 16-page document from Windows Write, we regained keyboard control after 38 seconds when using the parallel port versus 50

to a 5MP by adding two options: a \$349 PostScript module and a \$119 1MB module; the 5P and 5MP can hold up to 50MB and 35MB of RAM, respectively.

Both models are Energy Star-compliant and automatically



DESIGN LEADER: Capable of 120 gray-scale levels, HP's LaserJet 5MP printer can accurately reproduce black-and-white images. The LaserJet 5MP's infrared window (inset) pushes current thinking in laser printers.

seconds when using the infrared port. Both tests were performed with an HP OmniBook 600C notebook.

While HP says that the infrared connection has a range of 39 inches, in our tests we found that the connection worked consistently until the portable was about 80 inches from the printer. On the downside, configuring the IR printer drivers was an exercise in frustration as we struggled to overcome poorly designed installation software.

The PostScript-equipped 5MP uses memory far more efficiently than its predecessor; the 4MP came with 6MB of RAM and needed all of it to produce 600-dpi PostScript print. The 5MP comes with half as much RAM to produce the same output. The new 5P, like the 4P, comes with 2MB of RAM, which is adequate for all but the most complex PCL graphics pages. You can upgrade the 5P

settle into a 5-watt sleep mode. Instead of a control panel, you get a row of status lights, and you fine-tune the printer's settings using the included DOS or Windows control-panel software. An external \$239 PrinterPal accessory (not reviewed) lets the printer act as a receive-only fax machine.

The 5P and 5MP are rated to produce 120 shades of gray, and in test images they created dark, consistent blacks and subtle halftones. The fonts built into the 5P are the same 35 scalable PCL and 10 scalable TrueType fonts found on the 4-series; the 5MP also includes the standard 35 PostScript fonts.

Together with printer drivers for Windows, WordPerfect for DOS, and Lotus 1-2-3, the 5-series includes FontSmart, HP's new Windows font-management utility. This program displays all your TrueType, PostScript Type

1, and bitmap fonts, and comes with 100 fonts stored in a highly compressed format for quick installation or removal. The whole package uses 2MB of disk space.

FONT CENTRAL

The utility is based on ElseWare's technology, which is used in that company's overly elaborate FontWorks font-management and substitution program. Unlike FontWorks, FontSmart is genuinely useful. When you first load it, it searches your disk for all directories that contain fonts. When it loads again, FontSmart scans those directories and displays all fonts on one side of the screen, and all fonts installed in Windows on the other side.

Small bitmaps of uninstalled fonts let you survey all your fonts at a glance. A keystroke deletes font files—although when you delete Type 1 fonts, it removes only .PFB and .PFM files, not the .AFM or .INF files that often come with them. FontSmart can't match the sophistication of Ares Software's \$79 FontMinder management utility but is a fast, efficient font-management tool.

The new LaserJets are designed to reduce desktop clutter. Cable and power connectors are hidden behind pop-out panels so the printer looks finished on all sides. The lower tray holds 250 sheets of letter or legal-size paper, while a fold-down tray holds an additional 100 sheets. The normal paper path is C-shaped, but a fold-down panel at the back of the printer provides a straight-through path for thick paper or for when you want to eliminate paper curl.

The 5P and 5MP now rank as the desktop printers to choose if you don't need high-volume, high-speed output. They're compatible, flexible, effortless to use, and economical—like every other laser printer in HP's lineup. **HP LaserJet 5MP.** List price: \$1,299. Requires: PC with parallel port or IrDA infrared port. FontSmart for Windows requires: 3MB hard disk space, Microsoft Windows 3.1 or later. Hewlett-Packard Co., Santa Clara, CA; 800-752-0900; faxback, 800-333-1917.

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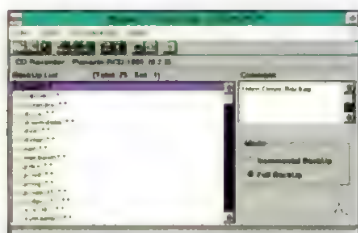
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GRAPHICS SOFTWARE

Convolver: The Personal Filter Factory

By Luisa Simone

Quick: What's the result of increasing the radius setting for an unsharp mask filter on your image of the Eiffel Tower? How do contrast and sharpening filters interact? And what is the difference between a normal blur and a Gaussian blur? If you don't know the answers to these questions—and even if you do—KPT's \$199 Convolver (thankfully short for Convolution Kernel Explorer) makes these questions irrelevant by providing a factory for creating filter effects.

Like its older sibling, Kai's Power Tools, Convolver is an Adobe plug-in application that can be accessed only through a host image-editing program like PhotoShop; Convolver includes Micrografx Picture Publisher LE to edit images and try out your filter creations. Convolver includes effects for sharpen, blur, embossing, brightness, and contrast filters, and duplicates the standard filter set of many image-editing programs. What Convolver provides that is unique is an innovative—and at times radical—interface that allows you to ignore the nuts and bolts that bog down traditional image-editing filters in favor of playful experimentation and letting your creativity rule.

There are three modes of operation: Explore, Design, and Tweak. Explore's interactive preview window provides 15 randomly generated permutations of the image you're working on. Exploring filter effects requires choosing which filters are active and the strength at which they will be applied. Just click on the version of the image you like best and the effect is applied.

The multiple-image preview window is also available in Design mode. Here it allows you to apply varying intensities of two specific filters simultaneously. We found that sharpening can increase the effects of the contrast filter, and invoking both filters can save you from over-correcting an image.

The dual advantages of Tweak mode are very precise control



SIDE-BY-SIDE: The split screen in the larger preview window allows you to compare the original and modified images.

over filter effects and very fast response times. Testing Convolver with Adobe PhotoShop 3.0 allowed us to use the included 32-

bit DLLs; other image-editing programs (like Micrografx Picture Publisher) may require you to use the slower 16-bit DLLs. In our testing, response time was so

fast that Convolver could actually animate filter effects, either by scrubbing between two versions of a picture or by blending previously saved parameters.

Even those tasks that are computationally intensive, like unsharp masking, are applied in real time—albeit to a small low-resolution portion of the original picture.

In fact, our biggest complaint concerns the preview window, which maps a portion of the original picture. We also wish that Convolver

would take advantage of the color-management functions offered by the host programs, because you lose the accurate displays offered by PhotoShop's CMYK preview or Picture Publisher's CMS functions when you invoke Convolver.

As a plug-in, Convolver breaks new ground by simultaneously making high-end image-editing programs more accessible and low-end image-editing programs more powerful. And because of that, it will appeal to both professional and occasional users alike.

KPT Convolver. List price: \$199. Requires: Adobe Plug-In—conforming host program, 4MB RAM, 4MB hard disk space, math coprocessor, Microsoft Windows 3.1 or later. HSC Software, Carpinteria, CA; 805-566-6200; fax, 805-566-6385.

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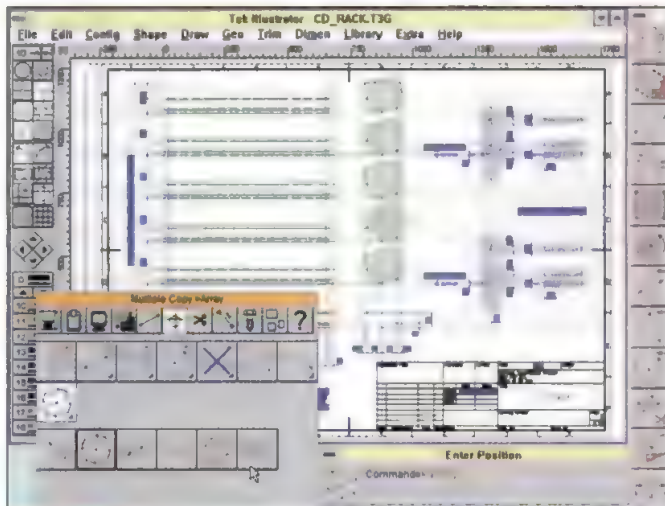
ILLUSTRATION SOFTWARE

Tek Illustrator Draws a Rough Sketch

By J.W. Olsen

Version 3.15 of TommySoftware Tek Illustrator has achieved some popularity in Europe and offers certain charms as a Windows-based technical-illustration and drawing tool. But it arrives stateside carrying some

unpleasant baggage, especially if you want to share your creations with others. Capable of supporting a powerful set of 40 user-definable pen and TrueType fonts, Tek Illustrator offers diverse geometric tools. These and other features can be accessed



EVERY WHICH WAY: You can access Tek Illustrator's functions from menus and permanent, floating, or pop-up toolbars.

unpleasant baggage, especially if you want to share your creations with others.

Tek Illustrator is accurate to 14 fractional digits, supports 300 lay-

ers, provides 100 levels of undo, and can work with 30 different international paper sizes. For tracing and sketching, Tek Illustrator formally supports CalComp Drawing Boards, but works well with Wacom digitizer tablets.

in a variety of ways, including traditional pull-down menus as well as a toolbar. Unfortunately, you can't suppress this toolbar to open up a larger working space.

Contrary to Windows convention, with Tek Illustrator you first choose an action, then select or create an object. At first this feels backward, but with practice it works well for repeating similar operations. With Tek Illustrator, you can open only one drawing at a time. What's more serious is that you can't move objects by clicking and dragging; all functions are performed via menus.

Perhaps the most serious weakness is that Tek Illustrator reads and writes AutoCAD's .DXF and .WMF files through different interfaces. In this area, Tek Illustrator lags behind Micrografx's Designer 4.1 TE, which acts like a clearinghouse for a variety of file formats.

Despite some weaknesses, you'll find that the solid feel, range of features, and overall speed may render Tek Illustrator useful, if your drawings don't need to be viewed by others.

TommySoftware Tek Illustrator, Version 3.15. List price: \$129. Requires: 4MB RAM, 6MB hard disk space, Microsoft Windows 3.1 or later. TommySoftware North America Inc., New York, NY; 212-807-9720; fax, 212-807-8149.

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FLOWCHARTING

Arcland FlowModel: Business Modeling Sans Analysis

By Catherine Kunkemueller

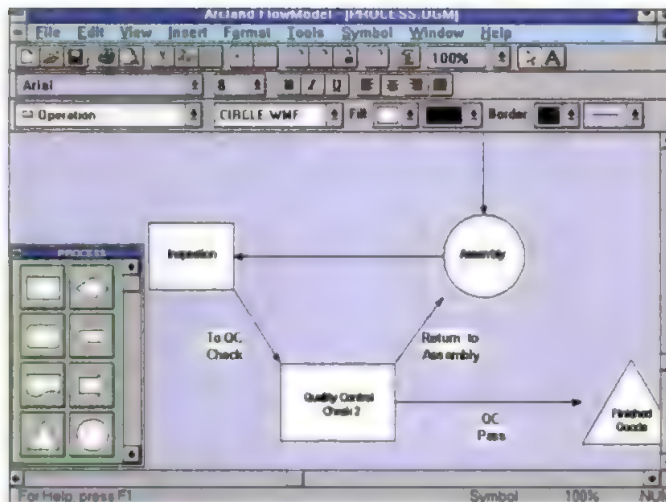
Need help redesigning a business process? The first step is finding a flowcharting program to illustrate your current (and later redesigned) situation. To do it right, you'll also need an analysis program to crunch through the numbers (such as throughput time, cost, or variance) and some way to move information between the flowchart and the analyzer. Arcland's \$495 FlowModel provides solid flowcharting capabilities and opens the door for data exchange, but it stays well clear of analysis.

As a front-end diagramming program, FlowModel allows you to associate data with each element of your process-flow diagram, export this data to your favorite spreadsheet or analysis program for in-depth number-crunching, and later import it back to FlowModel. Just don't expect fully integrated process-analysis capabilities, as are available with Scitor's Process Charter for Windows (First Looks, March 28, 1995). With Process Charter, you can run sophisticated simulations. FlowModel lets you draw the diagram, but you must go elsewhere for analysis.

FlowModel has a standard Microsoft Office-compatible interface and is easy to learn and use. Drawing new process flows is simple: Select a symbol from the customizable palette and point to a square on the screen's grid. Click-and-point connecting lines snap neatly into place. Symbols and connections are all customizable, and you can even spice up your diagram with imported bitmap images.

Layouts and routing styles—such as network, tree, organizational, or flowchart—can be dictated as templates or applied to part of the diagram. From the toolbar, you can undo or redo actions you later regret, scale the view, access the associated data fields, attach a note, and more.

When associating data with an object or connection, you get free choice of what fields to add, such



PROCESS MAPPING: FlowModel's Manhattan grid background makes describing a process as easy as point-and-click.

SPREADSHEET ADD-INS

Predict Adds Gray Matter to the PC

By Craig Stinson

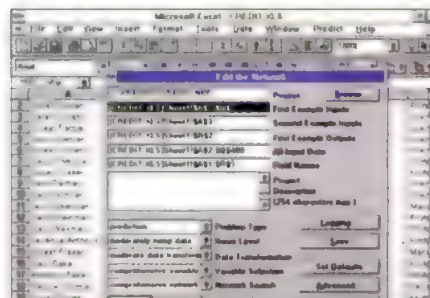
Like other implementations of neural-network technology, NeuralWork's Predict (\$1,995) is designed to help you make decisions or forecasts based on real-world historical data.

Predict works well in applications ranging from forecasting market directions to projecting system failures to evaluating credit risks. The program is implemented as an Excel add-in, allowing you to supply input in the form of an Excel worksheet, a delimited ASCII table, or an external data source that can read via Excel's Query tool. Alternatively, you can drive Predict from the DOS command line or batch file, or you can use a simple command to transform a finished Predict application into C code.

Success in applying neural technology is dependent on effective problem formulation. To a much greater degree than other recent desktop neural-net products, such as Promised Land's Braincel (First Looks, May 17, 1994) and Cheshire's Neuralyst (First Looks, February 7, 1995), Predict helps by setting reasonable output objectives; choosing

appropriate training, testing, and validation data sets; scaling data and eliminating outlying data points; transforming categorical data into numeric sets; and choosing the right input variables.

Predict assists with these mat-



HAND-HOLDING: Predict will walk you through the arcane task of neural analysis or let you do it yourself.

ters by supplying an extensive and lucid discussion of the issues and, more importantly, by automating most of the preprocessing steps. In its novice mode, the program interviews you about the problem at hand. Among the questions: Are the data points clean, moderately noisy, noisy, or very noisy? Do input variables require scaling, superficial transformation, moderate transformation, or

as average throughput time or name and salary of the person responsible for each step. Data can be exported in ASCII or comma-delimited format for use with standard spreadsheet programs and analysis tools, such as BenchMarker Plus Windows. Technology Economics goes a step further by offering a direct link to FlowModel with its BP-Analyzer. The program updates your flowchart when data is reimported.

Its data association feature raises FlowModel above the ranks of the standard flowchart programs, but it lacks analytical abilities.

FlowModel. List price: \$495. Requires: 8MB RAM, 7MB hard disk space, Microsoft Windows 3.1 or later. Arcland Inc., Malvern, PA; 800-315-8921, 610-993-9904; fax, 610-993-9908.

Circle 407 on reader service card

comprehensive transformation?

Once clear about your intent, Predict massages the data, uses a genetic algorithm to select input variables most likely to be determinants of output, and trains your neural expert. More advanced or courageous users can control all variables. You can override automatic data analysis for any or all fields, examine results of the vari-

able-selection algorithm, alter the tolerances that determine how carefully Predict searches for solutions, change the learning rule, and modify the weight decay that Predict uses for its "adaptive gradient learning." Nothing in the services that Predict provides for neophytes constrains the knowledgeable neural networker.

Predict does more than its competitors to take the blackness out of the box.

NeuralWorks Predict 1.0. List price: \$1,995. Requires: 8MB RAM, 3MB hard disk space, Microsoft Windows 3.1 or later, Excel 4 or later (for the Excel interface). NeuralWare Inc., Pittsburgh, PA; 412-787-8222; fax, 412-787-8220.

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MBAWARE

ManagePro 3.0: Goal Management, Team Style

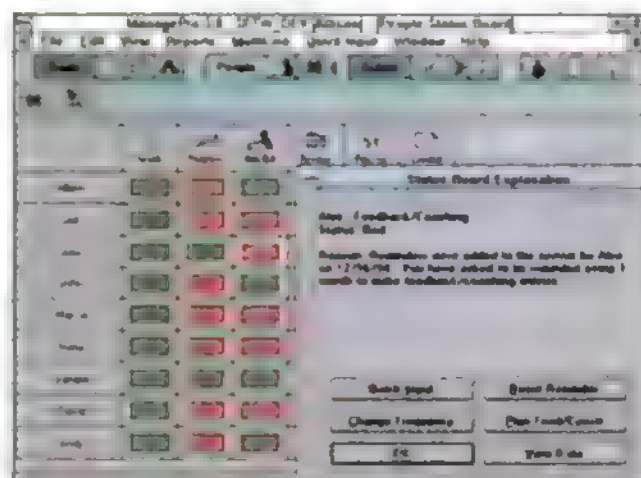
By Kathy Yakal

ManagePro 3.0 for Windows, from Avantos Performance Systems (estimated street price, \$199), automates a process that's often done haphazardly: managing and setting goals for employees. This latest release reaches out to the workgroup without compromising the innovative, reliable tools of the first two versions.

New in Version 3.0 is a set of 18 database templates. These consist of predefined sets of data types (goals, field names, and so on) tailored for specific industries, such as advertising, accounting, and nonprofit organizations. You'll probably need to modify these to fit your business, but this framework can get you up and running quickly, especially if you're an inexperienced goal-setter.

To help clarify its structure and tasks, ManagePro's main screen

supplies icons and pull-down menus that direct you to its three main sections. In Goals, you'll enter each goal's name, its assigned employee, due date, and



STATUS: Track the way a multiperson project is progressing with ManagePro.

status. You can build your own goals, too: ManagePro's outline structure, new monetary fields, and automatic project-scheduling features make it appropriate for small-scale project management.

You'll build employee databas-

es and track your progress in handling management tasks with each individual in the People section. ManagePro encourages you to set scheduled intervals for interaction with employees, from informal feedback sessions to formal reviews. And the Action section holds to-do lists and calendars.

Additional icons in the toolbar open the Assistant (a master page that reminds you of immediate and upcoming tasks) and the Advisor (a small database of context-sensitive guidance). The reports module is accessible from here, too: 35 standard reports can be customized with a generous number of parameters and filters.

ManagePro 3.0 adds MultiLink, a feature that broadens the package's appeal. Using MultiLink, in-

dividuals can set up their own databases and link to each other's, setting rules to determine which goals and data can be accessed by whom. Built-in e-mail also helps facilitate communication.

On the other hand, these workgroup operations require a shared directory with the same letter designation, so some peer-to-peer LAN users will have to run ManagePro off of one copy installed on one computer, with only a program icon installed on the other.

ManagePro, built on sound expert management theory, was already one of the better offerings in an emerging class of software called MBAware. Version 3.0 brings it up a notch with its new novice and workgroup features. **ManagePro 3.0 for Windows.** Estimated street price: \$199. Requires: 4MB RAM (8MB recommended), 7MB hard disk space (17MB recommended), Microsoft Windows 3.1 or later. Avantos Performance Systems Inc., Emeryville, CA; 800-282-6867, 510-654-4600; fax, 510-654-1276.

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PRESENTATION GRAPHICS

Astound Adds Multimedia Pizzazz

By David Haskin

Gold Disk's \$249.95 Astound 2.0 for Windows is a pleasant alternative to the best-selling presentation graphics programs, most of which are part of suites from Lotus, Microsoft, and

similar to PowerPoint's AutoContent Wizard in that you select a topic and Astound walks you through the creation process. You need only replace the dummy text, graphics, and charts with your own.

Besides the expected vector circles, squares, lines, and curves, Astound's graphics tools include a variety of geometric shapes, stars, and arrows. New charting capabilities include bubble charts, histograms, and spider plots. While its 31 chart types compare poorly with those offered by its competitors, Astound's abilities to fine-tune charts are comparatively strong.

You control chart appearance from a tabbed dialog box that includes choices for setting text, axis and legend characteristics, chart-wall thickness, and rotation and perspective of 3-D charts. Another tab animates charts as they

build and move during on-screen presentations. By making a selection from a drop-down list, for example, we added a pie chart that grew on-screen one slice of information at a time.

You can apply path animation and transition effects to all on-screen elements by using self-obvious dialog boxes. Using Astound's time lines, which are slider bars for precisely timing each element, we started a presentation's slide with music, then made the pixelated logo appear 1 second later. The main heading and bullets began appearing, one at a time, 2 seconds after that. Then the bullets disappeared, the music stopped, and the video started.

We found that Astound's time lines allow more precise building of slides than the one-layer-at-a-time technique that most presentation-graphics programs use. Also, while other programs use



From May 30 through June 2, you can go on-line to discuss Astound 3.0 with Gold Disk vice president Neil Snyder, Astound lead developer John Kaarid, and reviewer David Haskin. Type GO EXEC at any CompuServe prompt

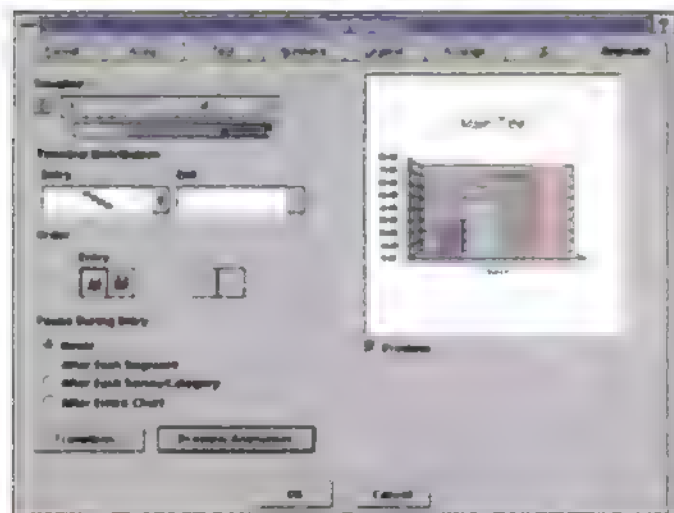
OLE to embed multimedia objects, Astound's built-in players are less clumsy and simplify the adding and fine-tuning of material. The program comes with Astound Studio, which includes vector drawing and painting applications and programs for creating animations and editing video and sound files.

The domination of software suites probably dooms Astound to a small share of the presentation-graphics market. That's a shame, because Astound 2.0 possesses strong abilities for creating stan-

dard presentations, and its multimedia power is superb.

Astound 2.0 for Windows. List price: \$249.95. Requires: 4MB RAM, 4MB hard disk space, Microsoft Windows 3.1 or later. Gold Disk Inc., Santa Clara, CA; 800-982-9888, 408-982-0200; fax, 408-982-0298.

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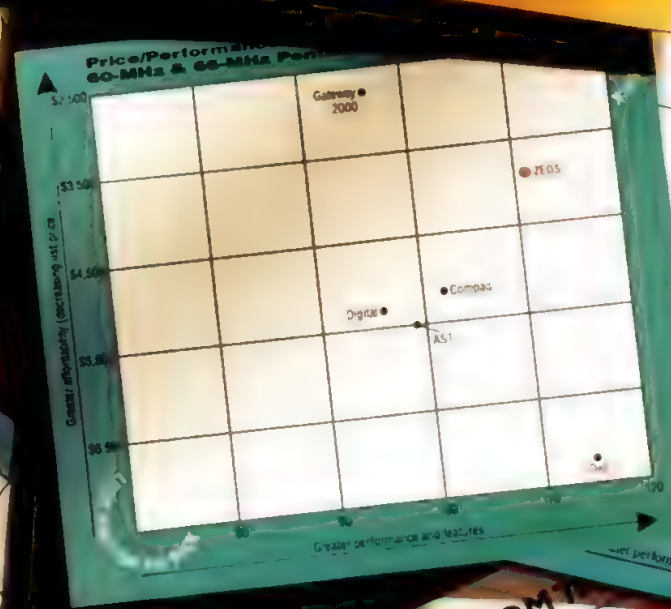
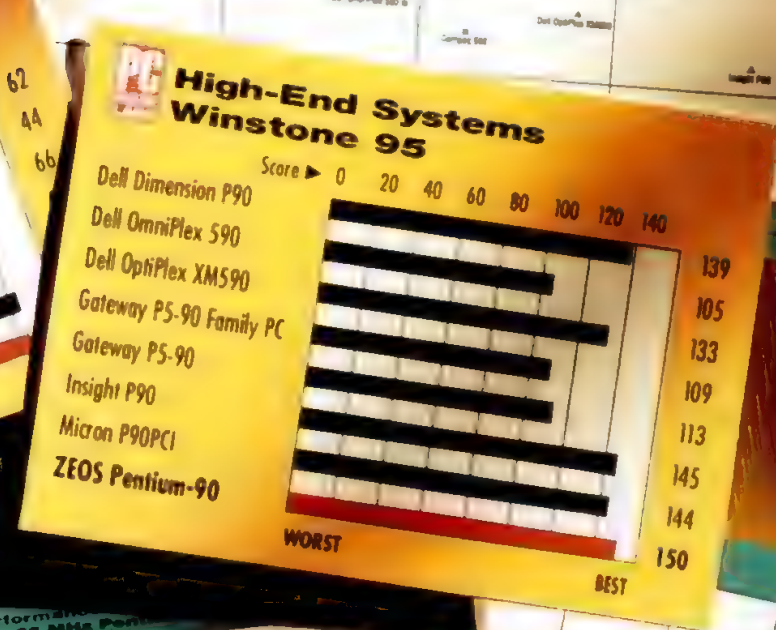
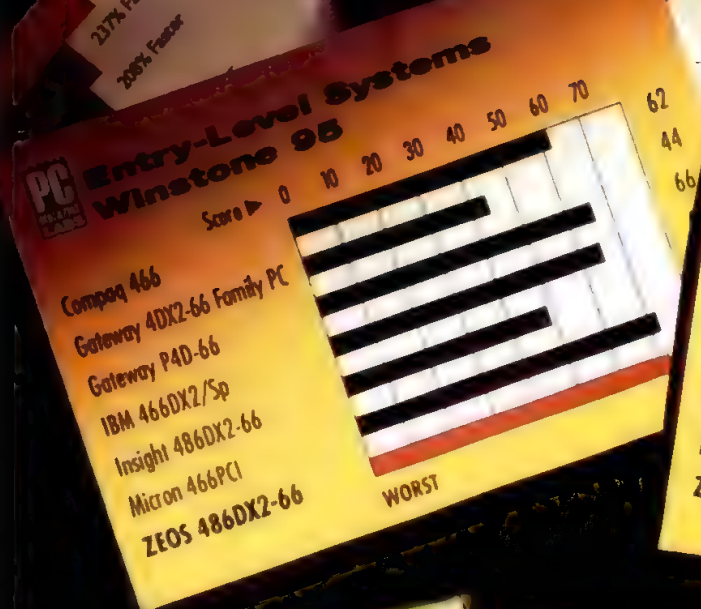


ANIMATE: You can control chart entrance and exit with a tabbed dialog box.

Novell. Astound equals its competitors' power and simplicity for creating standard heading-and-bullet presentations, but it far surpasses them in multimedia pizzazz.

Astound's new HeadStarts are

Test Us. We're Up To The Challenge.

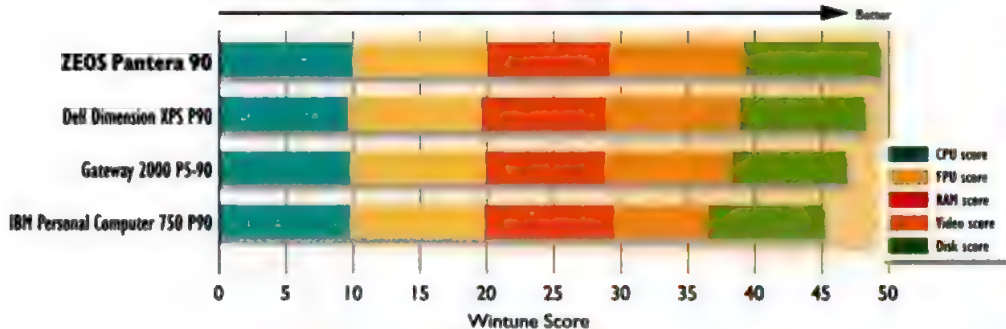




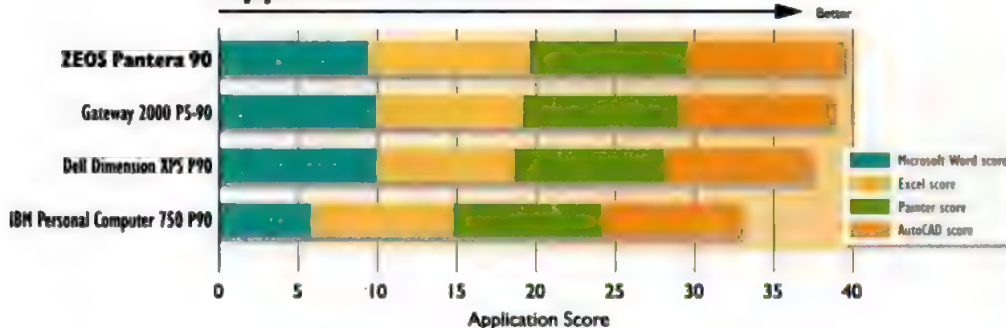
Once Again... "ZEOS® Clobbers The Competition."

- Windows Magazine, April 1995

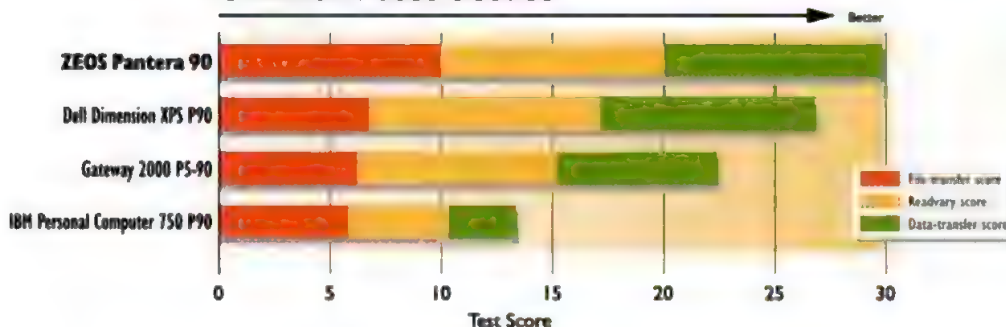
Wintune Benchmark Scores



Application Test Scores



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Reprinted from Windows Magazine, April 1995

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- Windows Magazine, April 1995



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Pentium-75	\$1645	Pentium-75 CNI	\$1945	Pentium-75 CNI	\$2445	Pentium-75	\$2845
Pentium-90	\$1795	Pentium-90	\$2095	Pentium-90 CNI	\$2595	Pentium-90	\$2995
Pentium-100	\$1945	Pentium-100	\$2245	Pentium-100	\$2745	Pentium-100	\$3145
Pentium-120	\$2245	Pentium-120	\$2545	Pentium-120	\$3045	Pentium-120	\$3445
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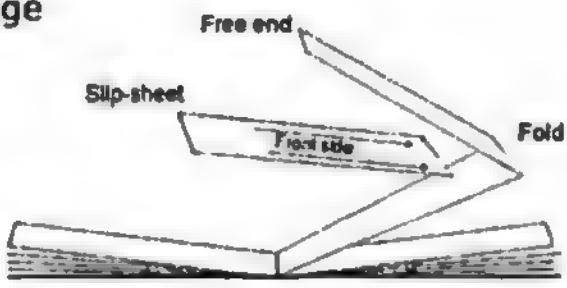
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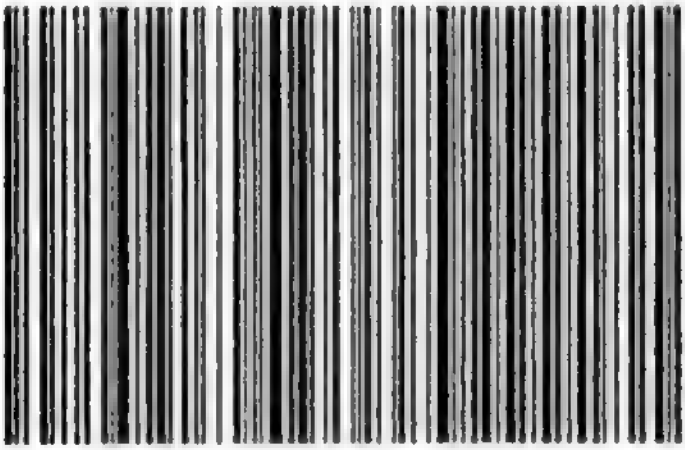
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1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



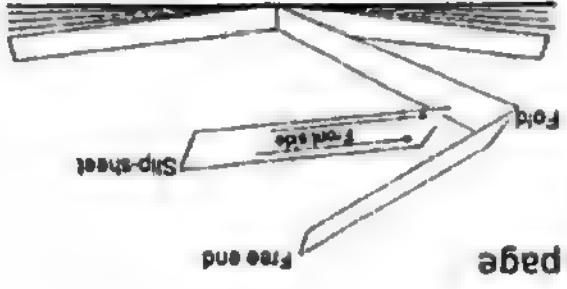
Inverted Foldout slip-sheet



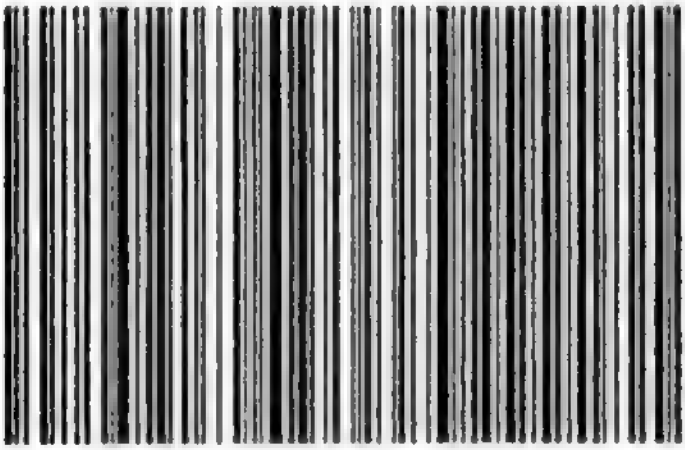
GbsSlipSheet-001

Foldout slip-sheet

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2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



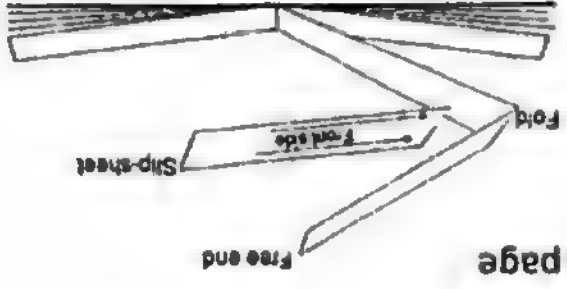
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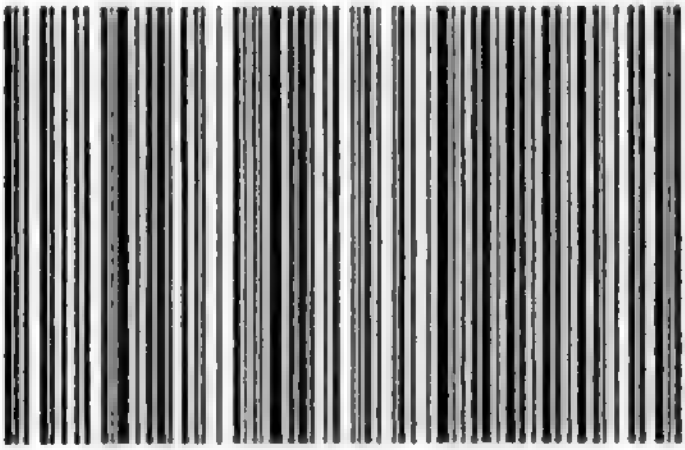
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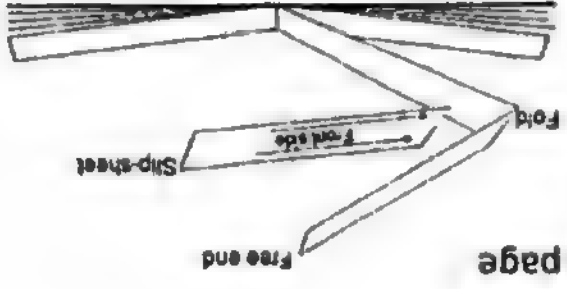
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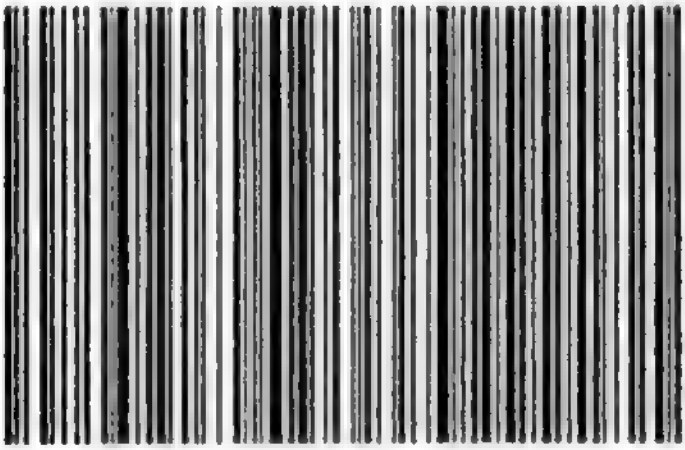
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Foldout slip-sheet

1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



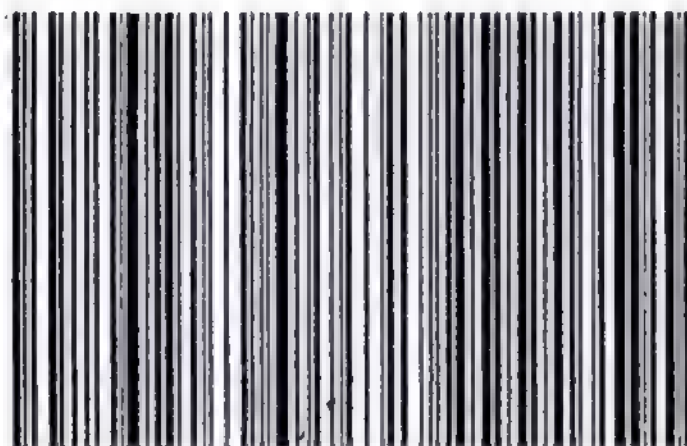
Inverted Foldout slip-sheet



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1. Follow instructions on the other side

Inverted Back



GbsSlpBack-0018

Back

1. Follow instructions on the other side

ZEOS' Pantera™ Scores Big.

High Power, Low Price Make You The Winner

"With high performance and a low price, this (Pantera) is the kind of high-end system we should all have," exclaimed *PC/Computing* in their April 1995 review of Pentium-100 systems.

Without a doubt, leading experts from top industry publications agree that the ZEOS Pantera is your No. 1 high-performance desktop system.

Just listen to what *Windows Sources* said: "The clear winner is the ZEOS Pantera. Its scores were the best across the board."

PC Magazine concurred: "Overall performance leadersthe Pantera line has a lot to offer—strong performance at a reasonable price...."

Unparalleled in the history of personal computing, the Pantera has continuously earned award after award—review after review—from *PC Magazine*, *PC World*, *PC/Computing*, *Windows Magazine*, and many more. Facing the challenge head on, "ZEOS clobbers the competition."

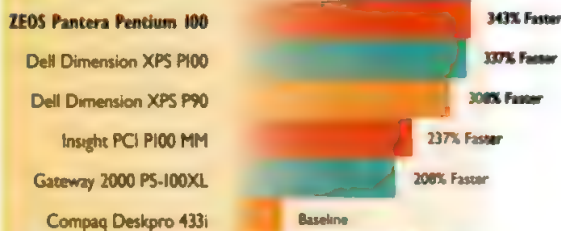
Top-Ranked Performance



The Pantera, based on Intel's 486, DX4 and Pentium processors up to 120MHz, leaps ahead of the pack with record-breaking performance and awesome power.

In their December 1994 Pentium and 486 roundup, *PC Magazine* gave top honors to the ZEOS Pantera: "Few product lines fared as well in our price/performance index as the ZEOS Pantera family. A major factor in the Pantera units' success was the outstanding Winstone 95 scores: The Pentium machines produced first-place scores in their respective tiers, and the ZEOS 486DX2-66 earned a top-five ranking among the entry-level systems."

Performance: Winstone



NOTE: WINSTONE 95 RUNS 15 OF THE MOST POPULAR WINDOWS BUSINESS APPLICATIONS.

Usability: Big but good. * * * *

Performance: Impressive. * * * *

Technology: Great sound. * * * *

Verdict: A definite winner. * * * *

Reprinted from *PC/Computing*, April 1995

What makes the Pantera the top performer—time after time? Superior engineering—starting with a ZEOS designed motherboard created specifically to take full advantage of the latest technological advancements. The motherboard is loaded with exceptional features such as PCI Local Bus expansion which delivers 32-bit data at a rate up to 132MB per second, an on-board PCI Local Bus Enhanced IDE Controller, and support for up to four IDE devices. EIDE hard drives are available to 1.2GB standard, upgradable to 4GB SCSI. For optimum EIDE hard drive performance,

the Pantera even supports Programmed I/O Mode 4, which gives you the fastest data transfer rates possible.

And there's more performance enhancing features like a Diamond Stealth 64-bit PCI video card *standard* for the fastest video performance, and a 4X CD-ROM for increased data transfer rates.

Buy With Confidence

ZEOS is committed to providing you with an excellent value. With all the extras, options, and compatibility with all major operating systems—including Novell NetWare and OS/2—you can't go wrong with the award-winning ZEOS Pantera.

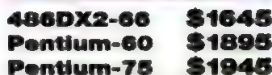
And with our *Computers Now!* program, many of our most popular money-saving Pantera packages are ready to ship *the same day you order*—look for the **CN!** logo. We also give you the option to custom-design a system to your computing needs.

Either way, you can buy with confidence because of our on-going dedication to provide you with high-quality features and state-of-the-art technology at an exceptional price. As *PC/Computing* said, the Pantera "...is a deal you simply can't pass up."

With striking performance, unequalled reliability and definitive value, the ZEOS Pantera is charting a new course in personal computing. It will make you the winner. To get the *Fastest Cat* around, call your ZEOS Systems Consultant today at 800-554-7172.



For more information, contact your local distributor or call 1-800-368-5868.

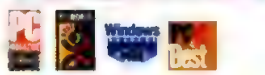


- 8MB RAM
- 850MB local bus IDE hard drive
- 4X CD-ROM drive, 3.5" 1.44MB FDD
- Diamond Stealth 64-bit PCI local bus SVGA graphics card with 1MB DRAM
- 14" SVGA color monitor
- 6-bay desktop case
- MS-DOS, Windows for Workgroups, Microsoft Mouse



The above system modified to include:

- 256K SRAM cache
- Diamond Stealth 64 Video PCI local bus graphics card with 2MB VRAM
- 15" SVGA color monitor upgrade
- 14.4/14.4 send/receive fax modem
- Lotus SmartSuite



- 16MB RAM, 256K SRAM cache
- 1GB local bus IDE hard drive
- 4X CD-ROM drive, 3.5" 1.44MB FDD
- Diamond Stealth 64 Video PCI local bus graphics card with 2MB VRAM
- 15" SVGA color monitor
- 6-bay desktop case (Pentium-75)
- 10-bay vertical case (Pentium 90, 100 & 120)
- MS-DOS, Windows for Workgroups, Microsoft Mouse
- Lotus SmartSuite



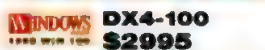
- 16MB RAM, 256K SRAM cache
- 850MB local bus IDE hard drive
- 4X CD-ROM drive, 3.5" 1.44MB FDD
- 16-bit sound card, stereo speakers
- Diamond Stealth 64 Video PCI local bus graphics card with 2MB VRAM
- 17" SVGA color monitor
- 10-bay vertical case
- MS-DOS, Windows for Workgroups, Microsoft Mouse
- Lotus SmartSuite

The above system modified to include:

- 24MB RAM
- 1.2GB local bus IDE hard drive
- High-power speakers w/ subwoofer



- 528MB hard drive
- 3.5" 1.44MB floppy drive
- VESA local bus SVGA color video
- 14" SVGA color monitor
- 4-bay desktop case
- MS-DOS, Windows for Workgroups, Microsoft Mouse



- 350MB IDE hard drive
- External 3.5" 1.44MB floppy drive
- 14.4 PCMCIA fax/modem
- 7.9" dual-scan color VGA display
- Custom leather carrying case
- Extra battery
- MS-DOS, Windows for Workgroups
- Lotus Organizer
- 7.8" x 10.2" x 1.7"; 4.1 lbs.

Pentium-75 \$3995
Package #2:

- 528MB IDE hard drive
- Internal 3.5" 1.44MB floppy drive
- Integrated stereo sound
- 10.3" dual-scan color SVGA display
- Custom nylon carrying case
- Extra battery
- MS-DOS, Windows for Workgroups
- Lotus Organizer
- 8.9" x 11.7" x 2.1"; 6.8 lbs.

For active matrix display, add \$800.

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CIRCLE 155 ON READER SERVICE CARD.

TAPE BACKUP

Colorado Memory's T1000 Gives More Peace of Mind for Less

By Winn L. Rosch

As hard disk prices have plunged, the cost of tape-based backup systems has stayed stubbornly high. Until the arrival of Travan tape technology, fitting the contents of a modern 400MB hard disk onto a single tape has required a \$1,000 tape drive. The first of an expected wave of Travan drives, the Colorado T1000 tape drive from the Colorado Memory Systems division of Hewlett-Packard changes that. The \$235 drive weds the low price of DC2000 backup with uncompressed cartridge capacity of 393MB, which can be doubled with data compression.

In addition to using the new Travan cartridges, the T1000 system is an evolutionary step forward in tape technology that retains much of the heritage of familiar minicartridge systems like Colorado's Jumbo 250. It is backward-compatible and can read and write QIC-80 (Jumbo 250) and QIC-Wide cartridges.

The T1000 sets itself apart by squeezing more data onto a cartridge at a lower cost than anything else available today. The secret of the T1000's high capacity is Travan technology, jointly developed by Conner, Iomega, HP, 3M, and Sony. Travan pumps up the familiar DC2000 minicartridge in two ways. Instead of quarter-inch tape, it packs cartridges with the same 8-mm (0.315-inch) tape used by the QIC-Wide format. This gives the drive over 25 percent more tape surface to use, enabling the track count to increase from 28 to 36. In addition, Travan adds an extra half-inch to the width and depth of cartridges, which allows the tape capacity to more than double—from 307 feet in a DC2120 cartridge to 750 feet in the Travan.

The best part of the Travan design is compatibility: A Travan drive accepts standard DC2000 cartridges and QIC-Wide cartridges as well as its own native tape—that's two different car-



SLIM JIM: The Colorado T1000 fits in the 3.5-inch form factor and can read and write any of the three popular tape standards. The Travan cartridge (left) hides wider tape than the DC2000 standard cartridge (right).

tridge sizes and tape widths in one drive. Compatibility extends to both reading and writing all three cartridge styles.

The challenge in adding capacity to the DC2000-style minicartridge was keeping a 3.5-inch floppy disk form factor so the dri-

ves would fit today's more compact PC cases. The Travan cartridge squeaks in with a curved, almost trapezoidal shape measuring 0.5 by 3.6 by 2.8 inches (HWD), smaller in the front (3.2 inches) than in the rear, where the tape spools reside. Internally, the Travan cartridge uses the same 3M mechanism as other quarter-inch cartridges and must be formatted before use. Each cartridge lists for \$45.

The T1000 connects to your existing floppy disk controller. A cable supplied with the drive easily installs to let the tape drive share the controller with up to two floppy disk drives. All told, the wiring portion of installation took a few minutes.

We found that, as with other floppy disk controller-based tape systems, the cost savings of sharing a controller is balanced by two penalties. The first and most onerous is that data transfer speed is constrained to floppy disk rates. In testing, uncompressed backups ran at about 2.3MB per minute, and automatic verification doubled the time required. Backing up a 100MB

uncompressed drive took 1 hour 24 minutes.

In addition, you can't use your floppy disks during backup sessions, even though the easy-to-use, Windows-based Colorado backup software allows you to switch to other applications during a session. Colorado also supplies DOS-based backup with the drive. In other words, you will want to schedule your full backups to take place overnight or when you're going to be away from your desk for a few hours.

HP's Colorado Memory Systems expects to follow up this drive with an external version that uses a PC's parallel port. But for now, if you're looking for backup technology that has one foot in the past and one foot in the future, the Colorado T1000 drive is a step forward.

HP Colorado T1000. List price: \$235. Requires: PC with floppy disk drive; for DOS, 420K RAM, DOS 4.01 or later; for Windows, 4MB RAM, Microsoft Windows 3.1 or later. Colorado Memory Systems, a division of Hewlett-Packard Co., Loveland, CO; 800-810-0133, 907-635-1500; fax, 907-667-0997

Circle 404 on reader service card

SCIENTIFIC SOFTWARE

Math Office Solves the Word Equation

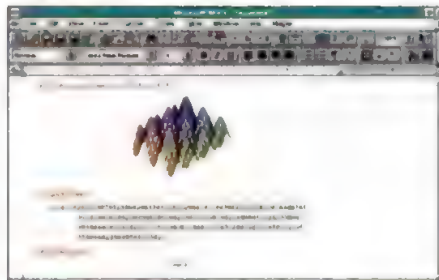
By Barry Simon

Waterloo Maple Software's \$129 Math Office for Microsoft Word 6.0 provides glue for those who want to integrate Word for Windows and Maple's mathematical engine, allowing them to evaluate or insert mathematical expressions and graphs into word processing documents with ease.

After you install Math Office, your documents include a template, which provides several new paragraph styles, and a menu of Maple commands. The most important command is Evaluate Statement, which passes the current line or selection via DDE to

the Maple symbolic math engine for evaluation. After it is evaluated, the result of the expression is returned as a Windows metafile. You can edit the metafiles using Microsoft Draw, the OLE component for metafile editing that is built into Word.

You can pass variables to the Maple engine, which are remem-



BELOW THE SURFACE: Math Office lets you invisibly use the Maple math engine to insert plots and do symbolic math inside Word.

bered for later calculations, and load external libraries for Maple functions. You can even define procedures using the Maple programming language; however, you can't access the interactive view changer for 3-D graphs.

The default installation replaces your NORMAL.DOT (saving your original as a backup), which is awkward for those with extensive customization of Word. There are effective workarounds, but this aspect of the product could have been better implemented. Except for this, the product is well thought through and effectively binds the Maple math engine to Word.

Math Office. List price: \$129. Requires: 8MB hard disk space, Windows 3.1 or later, Word for Windows 6.0, Maple V Release 3 for Windows. Waterloo Maple Software, Waterloo, Ontario, Canada; 800-267-6583, 519-747-2373; fax, 519-747-5284.

Circle 405 on reader service card

COLOR LASER PRINTERS

QMS *magicolor* LX: Brilliant Color at the Right Price

By M. David Stone

The big news about the fourth generation of QMS desktop laser color printing technology, the QMS *magicolor* LX, is that this time around, the company really got it right, combining high-quality prints with reasonable per-page costs. The *magicolor* LX features PostScript and PCL compatibility, up to 600-dot-per-inch resolution, and high-quality black-and-white printing as well as exceptional color reproduction. It is an all-around printer that is equally appropriate for producing color mock-ups, copies of presentation slides, and documents.

A big part of getting it right is the unit's \$4,999 price tag, which translates to an expected street price of about \$4,700. This is between several hundred dollars and several thousand dollars cheaper than color laser units from competitors that offer similar resolution, and offers more printer for the dollar than the innovative Tektronix Phaser 340 (First Looks, April 25) does.

AFFORDABLE MAGIC

The base price buys a printer with 12MB RAM, which is enough for 600-dpi resolution in black-and-white mode or 300 dpi in color mode. The printer can hold a maximum of 64MB of RAM. A \$700 option boosts memory by 24MB and raises color resolution to 600 dpi; an Energy Star option adds \$100.

In addition, the printer includes an 80MB internal hard disk for storing PostScript and PCL fonts, and a SCSI port for adding an external hard disk if you need more storage capacity. Included in the base price are 39 Type 1 PostScript fonts.

The *magicolor* LX is built

around a Hitachi color print engine. The unit measures 14.6 by 20.5 by 22.2 inches and weighs in at 106 pounds with all consumables in place.

The basic package includes a 250-page paper drawer and a manual feed tray, either of which can handle paper or transparencies. A \$129 feeder option with a second 250-sheet paper tray is available, as is a \$159 envelope feeder. You can also feed envelopes though the manual feed tray, but doing more than a handful of envelopes can be cumbersome.

Setup of the *magicolor* LX is similar to the procedure

printer managed a respectable 8.3-ppm text speed in PostScript mode and 8.5 ppm in PCL 5 mode.

The claimed 3 ppm for color seems about right, based on informal tests, though typically you'll spend more time sending a color image to the printer than the system spends printing that image. Image processing is handled by the *magicolor* LX's 33-MHz Intel 80960CF RISC processor.

Graphics output offers vibrant colors, with crisp edges for lines and text, and with solid areas well filled in. While the toner has a bit of a sheen, it is not enough to be disagreeable. And at 600 dpi, you have to look carefully to see the print's dithering patterns for dithered colors.

A minor though noticeable issue concerning the *magicolor* LX's output is the printer's tendency to leave a darkened strip of about 0.1 inches along one edge of solid blocks of color or patterned black-and-white areas. The darkening is slight enough

SIDE BY SIDE:

The QMS *magicolor* LX produces brilliant colors and sharp edges.

for monochrome laser printers, except that you have to install four developer cartridges and toner cartridges—one for each color: cyan, yellow, magenta, and black. But this is made easier because the price of the printer includes a visit by a technician who prepares and adjusts the printer for you.

FAST PRINTS

The key issues for any printer, of course, are speed and output quality. The QMS *magicolor* LX does well on both scores. Claimed speed is 12 pages per minute (ppm) for black and white, and 3 ppm for color. On our tests, the

topographic output for most purposes, right up to and including DTP applications, though at high resolution some images show posterization.

From a comfortable reading distance of 12 inches, the dithering patterns are just visible. The greatest effect is on thin straight lines, as can be seen in the ship masts in the print sample on this page. From about 2 feet away, the dithering patterns all but disappear. And keep in mind that this output quality is based on printing with standard duplication paper.

SHINY SURFACE

For text output, the toner's slight sheen is visible if you know enough to look for it. With a magnifying glass, you can see a slight raised effect, as with engraved invitations. But the letters are well formed, with crisp edges, and the text pages will probably pass for laser-quality output unless you add color images on the same page as text. The ability to mix text with images is one of the advantages that color laser printers have over most other high-quality color technologies.

Another advantage of laser technology is the cost of printing. QMS says that costs for the *magicolor* LX work out to just 3 cents for a typical text page with 5 percent black coverage and 12 cents for a page with 5 percent black plus 5 percent color. With pages that contain mixtures of text and images, the price rises sharply: 32 cents for a page with 5 percent black and 30 percent color and 80 cents per page for 5 percent black plus 90 percent color. That makes text pages a little more expensive than with a monochrome laser printer. At up to about 50 percent color page coverage, the price per page for the *magicolor* LX saves money over most color printing alternatives.

The *magicolor* LX is compatible with PCL 5C (the color version of PCL 5) and with PostScript Levels 1 and 2, using the QMS PostScript interpreters. More important, the printer sailed through PC Magazine Labs' compatibility tests for PCL 5 and for PostScript Levels 1 and 2. And it automatically switches emulations for each print job,



COLOR MAGIC:

The *magicolor* LX offers the right combination of features and attractive price.

that with most graphics images you have to look for it to see it.

As with any technology that uses dithering to produce colors, the *magicolor* LX is most appropriate for graphics rather than continuous-tone images such as photos. However, the 600-dpi resolution produces acceptable pho-

First Looks

which is important if you plan to hang this printer on a network.

This color printer comes with parallel, serial, and LocalTalk ports standard, and with Ethernet and Token-Ring interfaces as \$850 options. It can accept input from all ports simultaneously. One other option worth noting is a flatbed scanner that QMS plans to release this summer for about \$1,500. The scanner will plug into the SCSI port and turn the printer into a color copier as well.

DECISIONS, DECISIONS

How does the *magicolor LX* compare with the innovative Phaser 340 from Tektronix? Despite its similar-sounding name, the Phaser is not a color laser printer but uses an innovative solid wax ink jet technology to put a color image onto paper.

At a first glance, the Phaser 340's output is similar to the *magicolor LX*'s, but with slightly more muted colors and with less apparent dithering. Both the *magicolor LX* and Phaser 340 cost under \$5,000, but the former includes 12MB of RAM rather than the later's 8MB of RAM. Comparably equipped, the Phaser 340 costs \$1,700 more than the *magicolor LX* does. In addition, the *magicolor LX*'s print engine is capable of twice the resolution (600 dpi versus 300 dpi) at twice the print speed of the Phaser 340 (8 ppm versus 4 ppm).

The QMS *magicolor LX* produces a series of color laser firsts: It's the first color laser printer that's actually less expensive than buying separate monochrome laser and thermal wax transfer printers to handle text and color graphics, respectively; and the first printer that offers the right mix of features, price, and color quality to give the color laser market a chance—and a reason—to take off.

QMS *magicolor LX*. List price: \$4,999; Energy Star option, \$100; 12MB RAM upgrade, \$700; 120MB internal hard disk, \$999; extended font set, \$149; Token-Ring or Ethernet, \$850; thin wire, thick wire, or 10Base-T, \$149; DECnet-TCP/IP, \$1,050. QMS Inc., Mobile, AL; 800-523-2696, 334-633-4300; fax, 800-633-7213.

Circle 426 on reader service card

COLOR PRINTERS

Canon BJC-70: Color for the Road

By Alfred Poor

If you're headed somewhere over the rainbow and you want to create color pages from your laptop once you get there, people may think you're a wizard when you pull out a \$359 Canon BJC-70 ink jet printer and start pumping out color pages. They're likely to think you're a graphics professional when you show them the quality of the pages the BJC-70 produces.

Canon has managed to squeeze a four-color ink jet printer with 360-dot-per-inch resolution into a tiny package (2.2 by 11.8 by 6.2 inches) that tips the scales at just over 3 pounds. And if you're just printing text, you can get near-laser-printer quality using the larger-capacity all-black-ink cartridge, which can produce a higher resolution of 720 by 360 dpi.

FAST ON THE DRAW

Don't think that you'll have to wait forever for your pages, either. On PC Magazine Labs' benchmark tests, the printer churned out 3.1 pages per minute on the text speed test, and a respectable 2.1 graphics pages per minute. These results are as fast as or faster than the performance of many of the desktop color ink jet printers we've seen.

Print quality is equally impressive. There is no evidence of banding, the colors are saturated and vivid, and the prints are able to show shadows and highlights realistically.

The Windows driver offers a number of controls that let you adjust several parameters to get the best possible results. There are three dithering patterns (coarse, fine, and diffused) and settings for Print Quality and Intensity.

You can choose from several different kinds of print color and media (including transparencies, coated paper, and Canon's new backprint paper) and the driver will automatically choose the correct default settings for the other controls. You can still override these choices if you

want to customize your prints.

Setup and configuration are relatively easy. There are separate printheads and ink cartridges for monochrome and color. For color output, you use one printhead and two cartridges—one black and the other with the three color inks. For black-only printing, you use a different printhead and a single larger cartridge with just black ink. It takes all of a few minutes to replace the printhead and ink cartridges.

The printer displays operational information through its built-in LCD screen, which shows icons as well as text messages; there are six buttons to control the printer. It's a little confusing at first when you try to use the panel controls, but the on-line documentation that you install on your computer does an excellent job of explaining all the necessary procedures.

The BJC-70 provides 20 TrueType fonts plus Color Advisor, which is a Windows utility designed to help you pick effective color combinations for your documents. While it may be an intrusion at times, Canon's Color Advisor can help transform a garish presentation into one that is nonoffensive. There is also an on-line tutorial that guides you through setup and operation.

PRINTS TO GO

The printer has an optional battery pack that attaches to the back of the printer. It adds about 1.5 pounds to the unit's weight and is rated for 200 pages. The battery also has a switch to complete an occasional deep discharge, which is the best method for getting

maximum life out of a charged battery.

Canon provides technical support via a toll-free telephone number, Monday through Friday from 8:00 A.M. to 11:00 P.M. (eastern time) and on Saturdays from 11:00 A.M. to 6:00 P.M.

If you are looking for a way to stick a rainbow in your briefcase without spending a pot of gold in the process, check out the new



RED HOT: Canon's BJC-70 ink jet printer uses tiny ink cartridges (above left) to produce vivid and realistic color prints.

Canon BJC-70 ink jet printer.

Canon BJC-70. Estimated street price: \$359; optional battery pack, \$85. Canon Computer Systems Inc., Costa Mesa, CA; 800-848-4123, 714-438-3000; fax, 714-438-3317.

Circle 425 on reader service card

THE
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UNIX®
SYSTEM.

(OH NO, NOT ANOTHER ONE.)

Recently, IBM was awarded best-rated UNIX system by a noted consultant, D.H. Brown.

Now we're as proud as anyone to be ranked No. 1, but we can't help but notice that other companies are being ranked No. 1, too. And proudly telling the world.

Which raises a pesky question: If everybody can be ranked No. 1, what should you look for in a UNIX partner?

Good point.

We suggest you look at a number of things. The operating system. Range of applications.

And perhaps, above all, the ability to run your company using the different computers and platforms you already have in place.

Something that, you may have guessed, we're no strangers to at IBM. In fact, at the last Enterprise Management Summit, IBM surpassed all other vendors in systems and network management. On top of that, our RISC System/6000[®] and its UNIX operating system, AIX[®], connect to all hardware systems, including HP[®], Sun[®], DEC[®] and PC LANs, so you'll be able to keep working with your existing business computers.



RS/6000 is a leader in UNIX midrange sales.

What's more, RS/6000[™] products extend from notebooks to high-performance parallel computers, so your investment is protected as your business needs grow. As for software, with over 10,000 commercial and technical applications, your network can run everything from engineering to accounting to databases such as DB2/6000[™], CA-INGRES[®], INFORMIX[®], ORACLE[®], PROGRESS[®] and SYBASE[®].

Not surprisingly, when Kodak Japan needed a UNIX system that could deliver faster same-day service and would scale from their smallest warehouse to the largest, they went with RS/6000.

And when United Airlines system aircraft maintenance controllers needed to access critical information instantly and communicate it to a fleet of 550 airplanes, they chose RS/6000 to keep them connected.

The UNIX platform is a very powerful tool. And with our proven RS/6000 system running on AIX, there are hundreds of ways it can help your business stay competitive.

We'll be glad to show you how. Call us at 1 800 IBM-3333, ext. FA 105. Or, if you're on the Net, visit our Home Page at <http://www.ibm.com>. And see for yourself how we stack up.



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RS/6000 keeps United Airlines flying on time.

IBM

SCSI

SmartRAID Eases Data Management

By James Karney

Distributed Processing Technology is simplifying RAID data storage and SCSI operations for network servers and high-performance workstations with their SmartRAID product line. While not the cheapest approach to data storage, the SmartRAID system provides the user with a variety of capacity and cabinet choices.

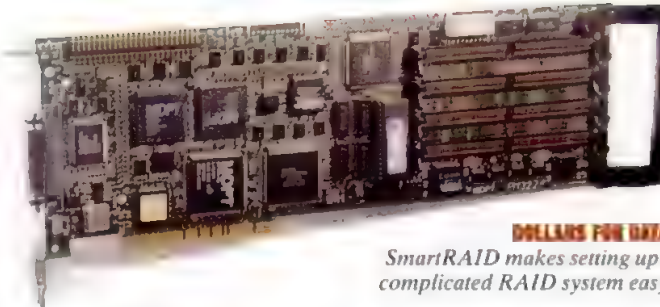
The SmartRAID PCI (\$1,995) and EISA (\$1,795) boards sport a 40-MHz Motorola 68030 processor, while the ISA (\$1,595) cards have a 10-MHz 68000 CPU. All of the cards can be hardware or software configured to run RAID level 0, 1, or 5, and you can add from 4MB to 64MB of cache as either standard SIMMs or DPT's proprietary Error Correction Cache (ECC) modules.

The SmartRAID storage units come in either a tower case (up to 12.6GB storage) or a pizza box Personal Storage Cabinet (up to 6.3GB). The tower offers dual power supplies and fans; it has the ability to report drive, fan, temperature, and power problems, and it can send on-line power failure announcements.

MIX AND MATCH

The SmartRAID controllers can be used to create mixed RAID systems. For example, a single card with six 2.2GB drives can be set up as a 2.1GB level 1 RAID array and a 4.2GB level 5 RAID array in a single tower. While we had no problems with the setup routine (regardless of the complexity of the system), the menus could have been more clearly designed. The manual is a complete introduction and reference for SCSI and RAID.

DPT includes drivers for just about any operating system you can imagine; however, we found that the Windows NT setup required the generation of a driver using DPT's software, which replaces the native NT driver. Once things are up and running



DOLLARS FOR DATA:

SmartRAID makes setting up a complicated RAID system easy.

you can track I/O and cache operations using a variety of diagnostic tools.

TOUGH CONFIGURATION

We set up two systems with the PCI SmartRAID card: one with a three drive tower configured in software as a level 5 RAID with three 1GB drives running Windows NT Server 3.5; the other system running Windows for

Workgroups and Windows NT with a PSC set up as a hardware level 0 RAID with 2GB drives and a 4GB DAT drive. Both adapters contained 16MB of ECC cache.

When we forced a failure on one of the drives, the SmartRAID card emitted an alarm that sounded like a host of crickets. We hotswapped the drive and used the DPT Storage Manager

routine to rebuild the data, which took less than half an hour.

These SmartRAID systems may not be the least expensive on the market, but the features, redundant safety systems, and attention to detail show that you get what you pay for. If you want solid operation and peace of mind on your server or power-user system, these cards and cases may be the right choice.

DPT SmartRAID. List price: SmartRAID PCI host adapter, \$1,995; SmartRAID EISA host adapter, \$1,795; RAID Tower as tested \$10,270; Personal Storage Cabinet, \$6,775; optional DAT unit, \$1,895. Distributed Processing Technology, Maitland, FL; 800-322-4378, 407-830-5522; fax, 407-260-5366.

Circle 427 on reader service card

CD-RECORDABLE HARDWARE

Pinnacle Micro RCD-1000 Lets You Make Your Own CDs

By Margaret Piemonte

Pinnacle Micro's RCD-1000 shatters the \$2,000 price barrier for a double-speed recordable CD (CD-R) drive, making it possible for network administrators to back up data onto a CD-ROM for pennies per megabyte and giving CD-ROM developers an alternative to using expensive production

an Adaptec 1542CF SCSI host adapter (which we used in our testing), EZ-SCSI software, and the SCSI cable.

DAG AND RECORD

The RCD-1000's premastering software is easy to use because most of the work involves dragging files to where you want them to end up on the CD. The software allows customization of file placement for optimum performance, automatic renaming of DOS files to the ISO 9660 format, creation of a virtual image, and mixed-mode CDs.

A separate utility for backups that ships with the product works on the same drag-and-drop principle as the premastering utility. It allows full backups of the entire disk or incremental backups—the choice is up to you. For an incremental backup, the program will search a backup CD with data on it and transfer only those files that have changed since the last backup was created. One caveat: Once the CD is created with the backup utility, it cannot be read by a standard CD-ROM unit and the data can only be retrieved with the restore command in the utility.

When using the RCD-1000, keep in mind that you will need a

large hard disk with an access time of at least 12 milliseconds to save the CD images. Also look for hard drives that do intelligent disk calibration rather than thermal calibration. Hard disks need to calibrate occasionally to ensure proper functioning. Anything that interrupts the CD-R from completing its write mode, such as a thermal calibration, will render the \$29 CD unusable.

BIG BUFFER

Another danger is buffer under-run, which occurs when the drive's buffer is emptying too quickly to feed information to the CD. Pinnacle's 1MB buffer helps eliminate this, but you'll find that it slows down recording speed to 150 kilobits per second.

Pinnacle makes recording your own CDs affordable, but before you decide to spend \$1,795 for the RCD-1000, make sure that the rest of your system is ready.

Pinnacle Micro RCD-1000. List price: Internal version, \$1,795; external version, \$1,895. Requires: 4MB RAM, SCSI host adapter, Microsoft Windows 3.1 or later, ASPI DOS manager for SCSI board. Pinnacle Micro Inc., Irvine, CA; 800-553-7070, 714-789-3000; fax 714-789-3150.

Circle 428 on reader service card

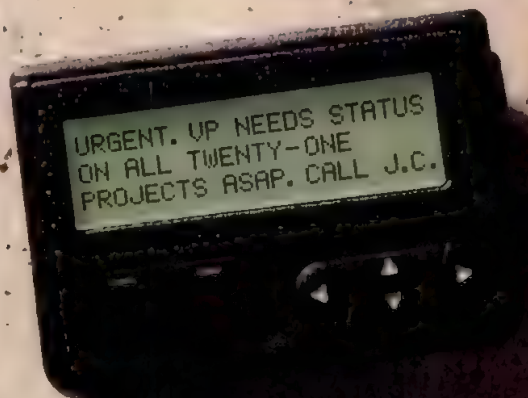


CD MACHINE: Pinnacle Micro's RCD-1000 makes it affordable to record your own CDs.

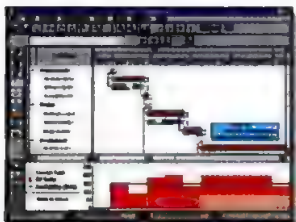
houses to record their titles.

In addition to recording data at 300 kilobits per second (double speed), the RCD-1000 supports all of the popular CD-ROM formats, including ISO 9660, HFS, CD-XA, and Red Book audio. The RCD-1000 drive has a 1MB buffer and ships with backup software and premastering software. For another \$200, Pinnacle will also include

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conflicts and resource allocation problems.

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Also new is a second-generation ODBC interface for selectively

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Project Scheduler's Advanced Resource Tracking Spreadsheet (ARTS)³ offers an easy, yet powerful, way to model and evaluate resource costs and usage on a period-by-period basis. Even quick comparisons of various "what-if" scenarios is a breeze with multiple undo/redos.

So quick, before your beeper goes off again, find out why *Computer Shopper* said, "if you want one project management package to choose for the long haul, choose Scitor's Project Scheduler 6."⁴



Before you make a project management software decision, call for the free executive summary. **Call 1-800-533-9876**



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PCMCIA

CardWizard Pro Deals a Full Deck of PCMCIA Cards

By Brian Nadel

SystemSoft's CardWizard Pro goes a long way toward solving one of the thorniest of notebook problems: getting PCMCIA cards to work. By combining an easy-to-understand interface with a complete assortment of PCMCIA 2.10 drivers, the \$69.95 CardWizard Pro comes very close to performing PCMCIA magic.

CardWizard Pro examines your system and then installs and updates the necessary drivers, so it is just as appropriate for a new portable PC as for updating an old one. Each PCMCIA slot has an icon that either shows it as empty or identifies the card that's in place; you can even choose which card is number 0 and which is number 1.

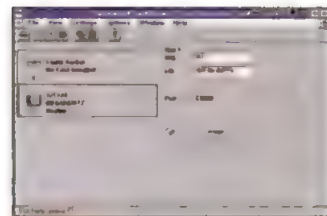
The first attempt at installation didn't transfer a needed DOS driver. The second try solved the problem, but created a conflict with an existing Megahertz X-Jack modem that CardWizard Pro reconfigured from COM 2 to COM 3 without changing the settings in the applications using the modem. Removing the Megahertz drivers from the AUTOEXEC.BAT file solved the problem.

CardWizard Pro proved adept at recognizing and correctly con-

figuring a dozen PCMCIA cards, ranging from modems to SRAM to flash memory to hard disks; only a Future Domain SCSI host adapter left it baffled. Each configuration is a time-consuming venture, because after CardWizard Pro recognizes the card, you must restart Windows. Of greater

concern is that CardWizard Pro can consume more than 100K of conventional memory.

By providing all you'll need to use a variety of PCMCIA devices, CardWizard Pro is a big step forward for some very small cards. **CardWizard Pro.** List price: \$69.95. Requires: 4MB RAM, 2MB hard



CARD GAME: CardWizard tells you what PCMCIA device is loaded.

disk space, Windows 3.1 or later. SystemSoft Corp., Natick, MA, 508-870-0050; fax, 508-651-8188. Circle 410 on reader service card

CD-SOFTWARE

CD Cabin Is a Life Preserver in a Sea of CD ROMs

By Barry Simon

Do you find that looking for a particular clip-art image or multimedia file is the most frustrating aspect of modern computing? If so, then The Aldridge Company's \$99 CD Cabin is the answer to your prayers.

Targeted at those who are swamped by unwieldy collections of clip-art and multimedia files scattered across a variety of CDs, CD Cabin logs the contents of your CD-ROM collection onto your hard disk and then lets you search for a file across multiple CDs.

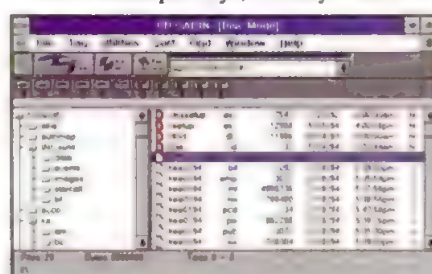
The searching mechanism offers several options. You can place CDs into categories and restrict the search to CDs that fall into one or more of those categories, or you can search across any selected subset. Unfortunately,

the program doesn't save any kind of thumbnail, so you'll need to find the CDs for a final check of files. But since you can sort files found on multiple keys, it's easy

view bitmap images, it will not display vector graphics, and the bitmap viewers do a poor job of displaying nonstandard palettes and of reducing 24-bit color pictures for 256-color displays. But this short-

coming is minor compared with this program's ability to bring order to the chaos of your CD-ROM collection.

CD Cabin, Version 1.0. List price: \$99. Requires: 2MB RAM, 2MB hard disk space, Microsoft Windows 3.1 or later, CD-ROM



SEEK AND YE SHALL FIND: CD Cabin lets you view the directory of CDs, even if the disk isn't in the drive.

to look at all the potential hits on each disk, one at a time.

While CD Cabin can play MIDI and .WAV audio files and

drive. The Aldridge Co., Houston, TX; 800-548-5019, 713-953-1940; fax, 713-953-0806.

Circle 408 on reader service card

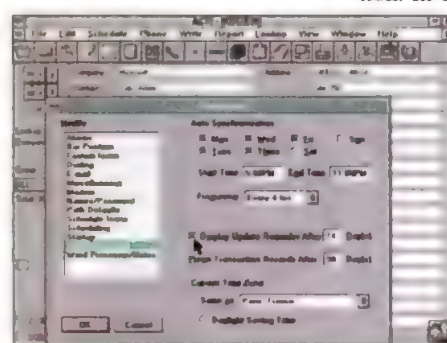
CONTACT MANAGERS

ACT! Mobile Link 2.0 Lets Contact Managers Hit the Road

By Gregg Keizer

Contact managers enter the realm of the mobile, portable world with Symantec's ACT! Mobile Link 2.0, a \$300 add-on to the ACT! for Windows 2.0 contact manager. Mobile Link adds remote synchronization while preserving individual database integrity and offering an efficient way to move information.

Flexibility is key to Mobile Link. It can connect via popular e-mail systems, direct dial-up to a LAN/WAN, and via the bundled



AUTO-PILOT: ACT! Mobile Link lets you automate data synchronization.

ACT! Mail Server. You select the contacts, notes, and scheduled events to synchronize, and Mobile Link transmits only the changes made since the last synchronization. In our tests, we found that

Mobile Link did not always synchronize properly, leaving out several names in one instance.

You can identify any number of users' databases with which to connect, decide how the data is to be transmitted (you can use e-mail to sync between a remote user and the in-house database), and then

set the program to automate the update process. Security hinges on defining a set of contacts, and the program prevents remote users from permanently deleting contacts in the central database.

In an ideal world, ACT! Mobile Link's abilities would be integrated into the contact manager itself. But until then, the cost of ACT! Mobile Link is the best bet to help ACT! workgroups better manage contacts.

ACT! Mobile Link 2.0. List price: \$299.95. Requires: 4MB RAM, 7MB hard disk space, Microsoft Windows 3.1 or later, ACT! 2.0 or later. Symantec Corp., Cupertino, CA; 800-441-7234, 503-334-6054; fax, 408-252-4694.

Circle 409 on reader service card

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*In Canada, call 1-800-387-5252. **Average U.S. street price. Monitor not included. ¹Source: 1994 HP Power and Associates Desktop PC Customer Satisfaction Study. ²Study conducted among business Second and third year, return-to-leaser. MS-DOS and Windows are registered trademarks of Microsoft Corporation. Pentium and the Intel Inside logo are U.S. registered trademarks of Intel Corporation.

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HP PCs
with IBM's and Compaq's:
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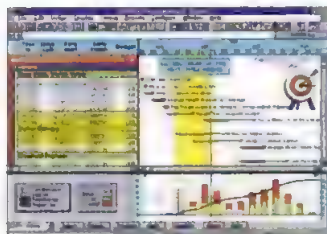


Everything you need to know about project management software.

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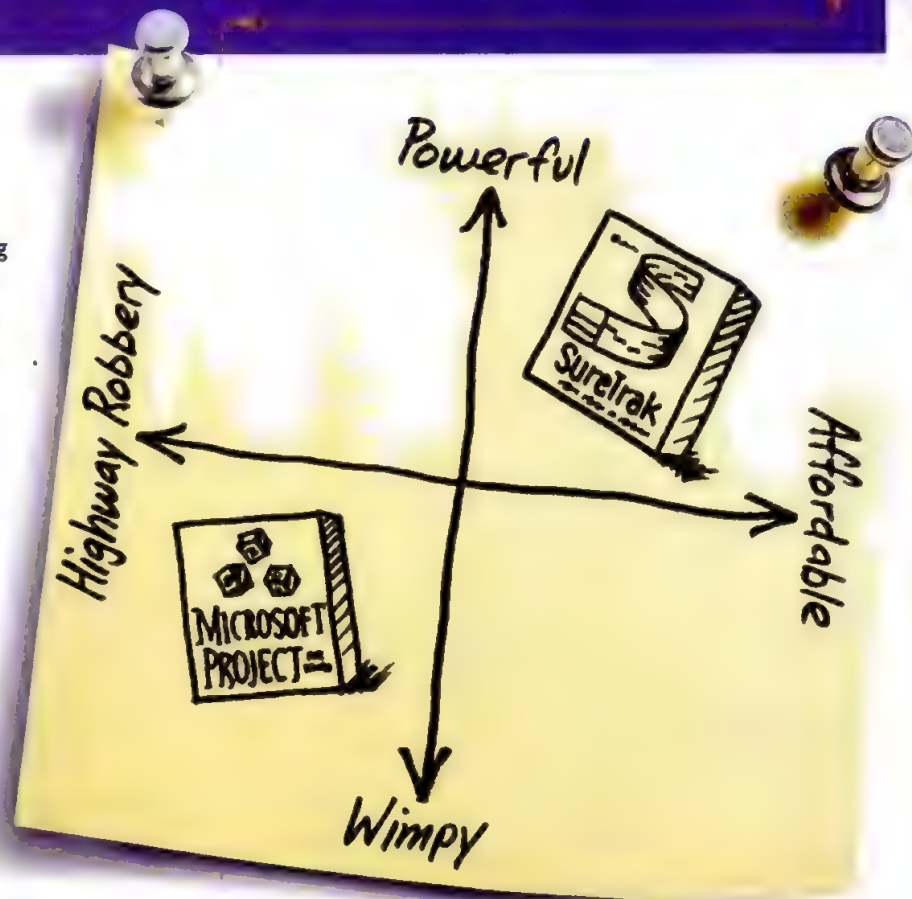
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New & Improved

NEWS OF ANNOUNCED PRODUCTS AND UPGRADES

By Asa Somers

The Plotter Quickens

Designed for use in small CAD/CAM environments, the speedy HP DesignJet 250C large-format color ink jet plotter, soon to be shipping from **Hewlett-Packard**, gives you three different print modes and 300-dpi output. In normal color mode, it can print a typical 24-inch-wide drawing in about 6 minutes. You must use HP's special coated paper for color prints, which brings the



MIGHTIER THAN THE PEN: The DesignJet replaces low-end pen plotters with ink jet technology.

per-page cost in at approximately 80 cents. HP will also be shipping a \$3,995 version of the 250C that can produce 36-inch-wide prints, as well as the \$2,395 24-inch and \$3,195 36-inch versions of the new DesignJet 230 monochrome plotter.

HP DesignJet 250C. List price: \$2,995. Hewlett-Packard Co., Palo Alto, CA; 800-851-1170.

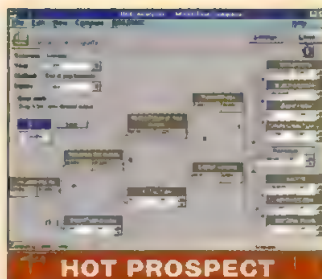
Circle 412 on reader service card

RAM for a New Millennium

Based on the new MGA-2064W chip and optimized to work with the new dual-ported WRAM (Windows RAM) memory, the MGA Millennium 64-bit graphics accelerator is soon to ship from **Matrox Graphics**. WRAM is faster and cheaper than conventional VRAM, so the Millennium with 2MB of memory costs a reasonable \$379. The MGA-2064W chip integrates graphics, video, and 3-D acceleration, supporting up to a 1,600-by-1,200 resolution with 16.7 million colors and a maximum refresh rate of 120 Hz. The card supports all the major 3-D APIs and comes with over 20 advanced productivity features, including instant mode switching, pan and zoom features, a virtual-desktop utility, and bird's-eye and spy-glass views.

MGA Millennium. List price: With 2MB WRAM, \$379; with 4MB, \$549. Matrox Graphics Inc., Dorval, Quebec, Canada; 514-685-2630; fax, 514-685-2853.

Circle 413 on reader service card



Cashé Gives You Tomorrow's Forecast in Dollars and Cents

Although it's billed as "Quicken for CFOs," Cashé (\$995), from **Business Matters**, is a high-end package designed to forecast future business performance rather than handle accounting tasks. You start by providing raw information about your business; Cashé handles all the involved computations and requires no programming, delivering streamlined results to you via its intuitive interface.

Focusing on a five- to seven-year future, the product builds models of sales, expenses, payroll, and a host of other business aspects; the models grow increasingly complex as you add variables. You can compare actual versus budgeted performance, track the movement of key variables over time, or place your business's performance in the context of your competitors' with a few mouse clicks.

You can import up to ten years of historical information about your company from third-party spreadsheets or accounting programs. Just show Cashé how you've set up your records in the past and it automatically creates a link, updating your model as you change your spreadsheet.

Cashé provides adjustable sensitivity controls, "what-if" analysis, several valuation methods, and a number of reports and charts. You can easily build automatic audit trails. Seventeen adjustable high-level assumptions and the ability to build up to 32 scenarios let you forecast dozens of future possibilities for your business.

Cashé. List price: \$995. Business Matters Inc., Waltham, MA; 617-899-8700; fax, 617-899-1100

Circle 411 on reader service card

FrameMaker Gives You The Runaround

Release 5 of the Editors' Choice-winning professional desktop publishing package FrameMaker will soon be available from **Frame Technology Corp.** Traditionally considered the choice for publishing long technical documents, FrameMaker now includes new mainstream DTP features. Like QuarkXPress, FrameMaker now automatically flows text around graphics and allows headlines to "straddle" multiple columns. It supports text import by reference and features a reengineered filter architecture for more consistent import and export across multiple platforms. FrameMaker is available in Mac and Unix versions as well, and you can purchase a Frame Developer's Kit for \$1,500. Separate FrameViewer packages are available for viewing FrameMaker files; price depends on the quantity you order. **FrameMaker, Release 5.** List price: \$895. Frame Technology Corp., San Jose, CA; 800-843-7263. Circle 414 on reader service card

Roll Out the Tablet

Soon to be shipping from **Summagraphics Corp.** is the SummaFlex, a pressure-sensitive, flexible graphics tablet. Measuring 18 by 24 inches, the SummaFlex rolls out onto the desktop, where it can serve as both a drawing tablet and a traditional work surface. You can turn the SummaFlex on and off as needed or designate any portion of the tablet as the active surface area. The \$849 model comes with a cordless, three-switch, pressure-sensitive stylus.

SummaFlex. List price: \$849. Summagraphics Corp., Austin, TX; 800-337-8662, 512-835-0900; fax, 512-835-1916.

Circle 415 on reader service card

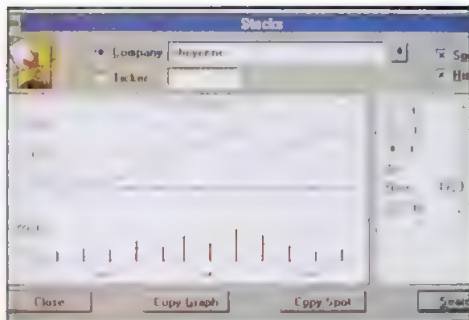


ROLL WITH IT, BABY: Draw more naturally on the big SummaFlex tablet.

Profound Finds the Needle In the On-Line Haystack

Professionals needing to cull relevant business information from the increasingly bloated information superhighway can now look to a new service from Profound. The eponymously named on-line service is designed to compete with expensive professional database services, providing global market and industry data, research, company and broker information, and late-breaking, up-to-the-minute news at a more affordable cost.

Profound's Custom Alert feature automatically searches by user-defined criteria, delivering updates of the most relevant information. The program comes bundled with Adobe Acrobat software and provides PDF documents that retain their original format. Profound's InfoSort technology creates a table of contents for each re-



DATA POINTS: Profound's reports retain their original format.

port it sends, detailing the precise location of desired information.

Profound. List price: \$19.95 per month, plus \$6.95 per hour on-line. Profound Inc., New York, NY; 800-270-9896; fax, 212-750-7147.

Circle 430 on reader service card

Creative Modem Blasts Off

Creative Labs, maker of the industry-standard Sound Blaster line of audio cards, has entered the telecommunications market with two modem offerings. Aimed at the home and SOHO markets, the Modem Blaster 28.8 and Modem Blaster 14.4 units will sell on the street for around \$220 and \$100, respectively. Both models are internal cards only, although Creative will be debuting external models later this year. Both Modem Blasters come bundled with four on-line games and an Internet-navigation package.

Modem Blaster 28.8. Estimated street price: \$220. **Modem Blaster 14.4.** Estimated street price: \$100. Creative Labs Inc., Milpitas, CA; 800-998-5227, 408-428-6600; fax, 408-428-6611.

Circle 416 on reader service card

HARDWARE BRIEFS

EXP Computing is shipping the ThinFax 288i, a Type II PC Card-compatible V.34 fax modem. The hot-swappable, \$399 ThinFax connects to a standard wall-phone outlet via an included cable and handles 28.8-Kbps data transmissions and 14.4-Kbps fax transmissions. EXP is also offering the \$499 ThinFax 288c, which handles cellular transmissions via included cables. 800-397-6922

Ositech Communications has expanded its Trumpcard series of multifunction PCMCIA devices with the \$749 Jack of Diamonds card, which combines an Ethernet adapter with a V.34 fax modem in a Type II PC Card. The card ships with DOS, Windows, Windows NT, and OS/2 drivers. A \$99 upgrade makes cellular transmissions possible. 800-563-2386

The MPEG Video Producer, from **Optibase**, is a real-time MPEG-I encoder that features analog component input, a digital serial input option, and software upgradability to Optibase's high-end MPEG Lab Suite. The Video Producer lists for \$9,995. 214-774-3800

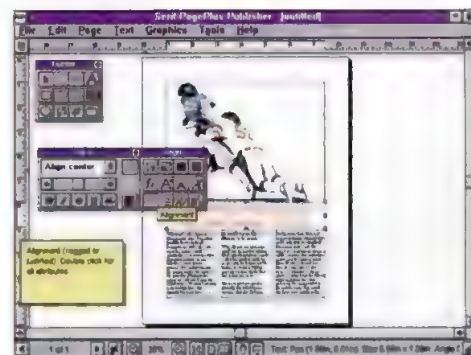
For mission-critical power protection, **Clary Corp.** has begun shipping the OnGuard LI-800 800VA-rated line-interactive UPS. Designed for use with high-end workstations and midrange servers, the \$699 LI-800 includes a built-in micro-processor and an RS-232 interface for use across a network. The unit supports SNMP and the NetWare Management System, and comes with Power Monitor Plus, a DOS- or Windows-based diagnostic package. 800-442-5279.

Eastman Kodak Co. is shipping the Kodak XLS 8400 PS color printer, which produces full-color prints and transparencies with an image area of up to 8.4 by 12 inches. It prints a full-color page in about 75 seconds at a per-page cost of \$2.08 for a paper print and \$2.60 for a transparency. An optional network card for use on NetWare and TCP/IP LANs costs \$995. The \$7,495 printer comes with 32MB of RAM and a SCSI port for attaching an external hard disk. 800-235-6325.

Axonix Corp. has introduced the Pro-Media Player, an all-in-one portable audio unit that includes a dual-speed CD-ROM drive, 16-bit Sound Blaster-compatible audio capabilities, a 4-watt stereo amplifier, and built-in stereo speakers. The \$499 unit plugs into a Type II PCMCIA port and also includes a microphone, stereo line in, headphones, and an external microphone jack. 800-866-9797.

Under One \$120 Roof

Serif has begun shipping the Serif Publishing Suite, an all-inclusive group of word-processing, desktop-publishing, image-editing, and illustration software packages. Centered around the full-featured but low-cost PagePlus 3.0 DTP package, the suite is expected to sell on the street for about \$120.



MORE FOR LESS: PagePlus 3.0 is only one part of Serif's new suite.

Serif Publishing Suite. List price: \$199. Serif Inc., Nashua, NH; 800-697-3743, 603-889-8650; fax, 603-889-1127.

Circle 418 on reader service card

Color By Numbers

Matching colors displayed on an RGB monitor with those created by a four-color printer has always been a tricky business. Color-matching systems have evolved, and one of the most often-used is that from **TruMatch**, which has announced Version 2.0 of its SwatchPrinter Software for Windows.

The new version lets you print a reference guide that shows the RGB equivalents of four-ink colors. The software automatically formats the guide for your paper size and uses the fewest sheets possible. A new primary hues index option lets you print the 50 brightest and most saturated colors in each TruMatch hue family on a single page. Working with an optional paper-based TruMatch fanguide, users can enter colors directly into any application supporting CMYK mode.

TruMatch SwatchPrinter Software, Version 2.0. List price: \$48; bundled with paper-based fanguide, \$113. Trumatch Inc., 800-878-9100, 212-302-9100; fax, 212-302-0890.

Circle 420 on reader service card

Just the Address, Ma'am

Besides allowing for multiple addresses per entry, Day-Timer AddressBook from **Day-Timer Technologies** provides a nickname field, spaces for 6 phone numbers, 12 customizable fields, and

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LAN Times

"NetCruiser—best Internet front end."

Online Access Magazine

"NetCruiser is great for people who are intrigued by the Net but intimidated by the commands usually required for access."

PC/Computing



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Best of all, with NetCruiser service you get NetCruiser software FREE. It's fun. It's easy. And, with simple point-and-click icons to guide you along the way, it can have you up and running in only minutes.

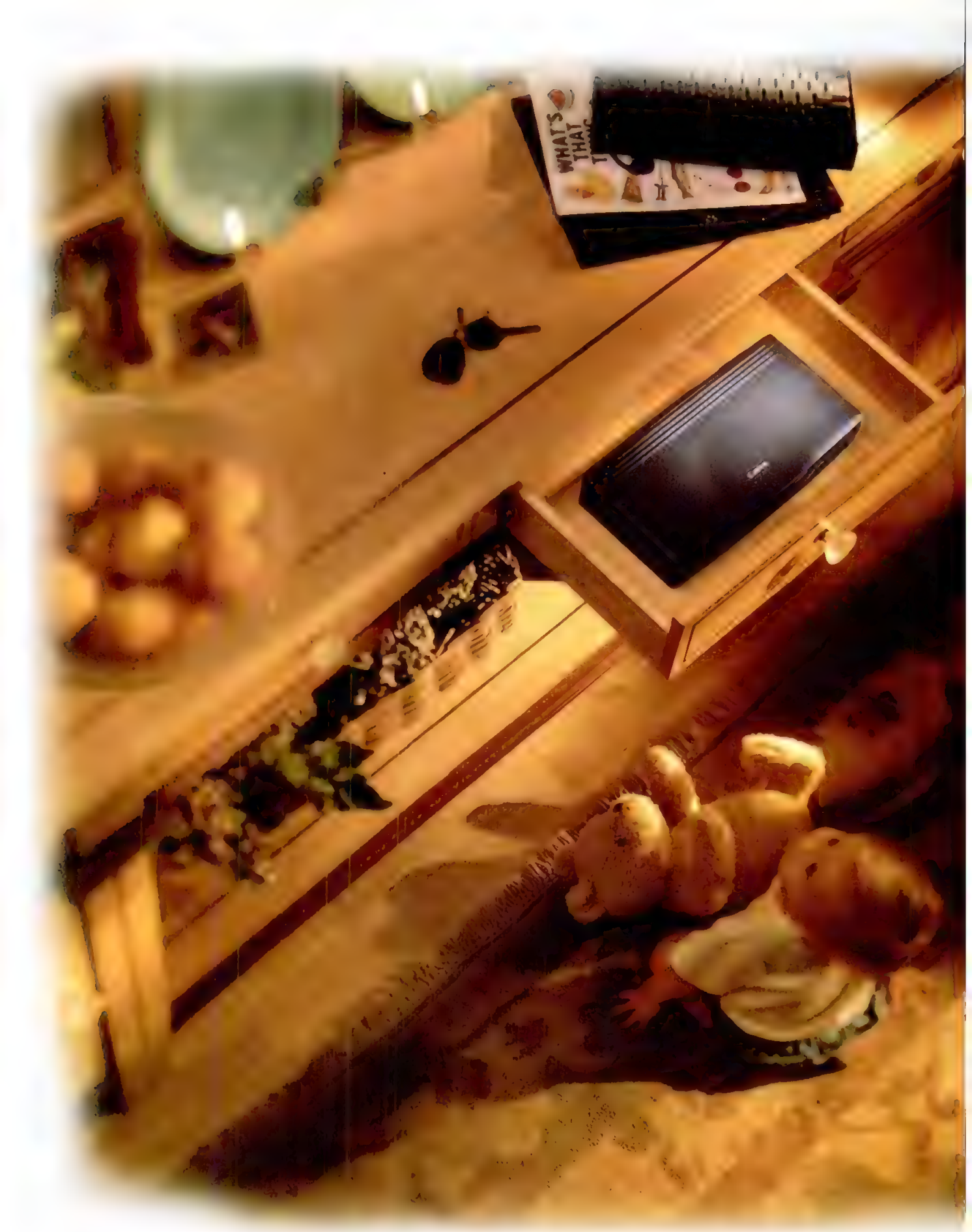
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*Full Windows 95 system required. Minimum system requirements: 100MHz processor, 1MB RAM, 100Kbps modem, 100Kbps network connection. © 1996 Netcom. All rights reserved.



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BUBBLE JET
PRINTER

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New & Improved



STRIPPED DOWN: Day-Timer AddressBook features 12 customizable fields.

up to 35 pages of notes. But this focused software package doesn't go much further—on purpose. It's designed to be an intuitive, efficient contact manager for users who don't need—or want—a full-blown PIM like Day-Timer Organizer. AddressBook includes an autodialer and a telephone log to track calls; you can search by keyword, sort by several different methods, and print in formats that fit most paper-based organizers.

Day-Timer AddressBook. List price: \$49.95. Day-Timer Technologies, San Mateo, CA; 415-572-6260; fax, 415-572-9675.

Circle 419 on reader service card

GoldSync Gets Remote Users Up to Speed

Just before last year's Fall Comdex, **ELAN Software Corp.** announced the GoldSync Remote Synchronization Gateway, an add-on package for ELAN's GoldMine contact manager. The new product, which should be shipping by the time you read this, will let network users synchronize GoldMine files on their portable or home computers with those on the network LAN over standard telephone lines.

The Gateway package allows you to specify an unattended synchronization: At a user-defined time, the remote system will contact the host, synchronize the files, and disconnect.

GoldSync Remote Synchronization Gateway. List price: Two-user package, \$299; five-user package, \$695. ELAN Software Corp., Pacific Palisades, CA; 800-654-3526, 310-454-6800; fax, 310-454-4848.

Circle 421 on reader service card

Setting Up Shop On-Line

Netscape Communications Corp. has announced a package designed to help merchants create electronic "stores" on the Internet, where consumers can browse, ask questions, and purchase goods and services. The \$20,000 IStore will be shipping

SOFTWARE BRIEFS

HSC Software has begun shipping its own library of digital photos, KPT Power Photos. The five-volume, CD-ROM-based series features 500 royalty-free images taken specifically for use in this collection. Each volume of photos has a theme: natural backgrounds and textures; food; urban textures; sky, water, and landscapes; and sports and recreation. Until July 1, Power Photos sells for \$99; thereafter, you'll pay \$199. 805-566-6200.

Passport Designs has introduced Master Tracks Pro, Version 6.0, a MIDI sequencing program listing for an attractive \$149. New features include multiport support, allowing for up to 256 MIDI channels; a velocity window, showing a graphical representation of every note's velocity; and a Big Counter feature, allowing you to monitor the sequence from a distance. The program supports step entry, automated punch-in, and graphical note-editing via mouse clicks. 415-726-0280.

Second Chair Corp. has introduced Version 2.0 of the Trial Lawyer's Assistant, which combines case management and litigation support. The \$1,500 package centers around a relational database for managing all case activities, and the database links directly to the docketing and billing systems. The Assistant supports OCR for importing transcripts and exhibits, has full OLE 2.0 capabilities, and allows for fuzzy, Boolean, and wildcard searches. Discounts are available for volume purchases. 800-598-3247.

Despite its employee-specific name, Visual Staff Scheduler from **Atlas Business Solutions** is designed to handle a number of business scheduling tasks. The \$149 program generates cost estimates of employees or projects, while a coverage watch monitors the number and type of employees you have scheduled and helps to eliminate scheduling conflicts. 800-874-8801.

Whether or not a PCMCIA device conforms to industry standards has not historically shown that it will work with any other PCMCIA-compliant device. The \$69.95 CardWizard Pro from **SystemSoft** lets users quickly troubleshoot card configuration problems, resolve resource conflicts, and launch applications upon card insertion. The software guides you through a series of dialog boxes to diagnose compatibility issues, such as missing drivers, improperly installed software, port conflicts, or incorrect allocation of memory windows. 508-879-0050.

soon for use in Unix and Windows NT environments.

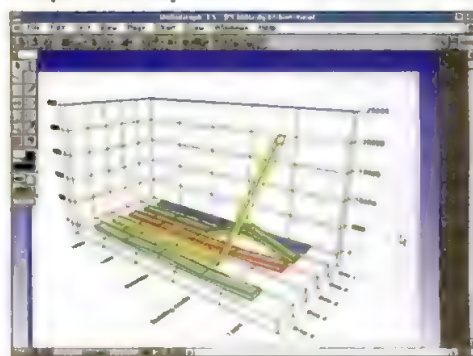
IStore features an embedded relational database for information tracking and management, electronic credit-card processing for real-time authorization, billing and order processing, and built-in reports for information retrieval. Built upon the Netscape Commerce Server, IStore uses the Secure Sockets Layer protocol to ensure secure commercial transactions via encryption, digital signatures, and message integrity.

IStore. List price: With Netscape Commerce Server, \$20,000. Netscape Communications Corp., Mountain View, CA; 415-528-2555; fax, 415-528-4121. Circle 422 on reader service card

Something Wild: Go Chart Crazy with DeltaGraph

Now shipping from **DeltaPoint**, the Windows 95-compliant DeltaGraph Pro 3.5 for Windows adds some esoteric chart types and higher-end features for use by business and technical professionals.

Eighteen new chart types—including "whisker" and "candlestick" investment charts, pictographs, ogive and histogram statistical charts, and six quality-control charts—have been added to the package, bringing DeltaGraph's total up to 63. More than 200 chart



IT'S GRAPHABLE: DeltaGraph Pro 3.5 now offers over 60 different chart types.

styles are available to choose from, and DeltaPoint has added OLE 2.0 client support, so changes in your third-party spreadsheet are reflected in your chart. DeltaGraph Pro 3.5 now features 360-degree 3-D chart rotation, 3-D perspective, label rotation in 1-degree increments, and savable user-defined curve-fit formulas. This version runs under Windows 95 and Windows NT as a true 32-bit application and allows you to share files across Windows and Macintosh platforms.

DeltaGraph Pro 3.5 for Windows. List price: \$195. DeltaPoint Inc., Monterey, CA; 800-446-6955; 408-648-4020.

Circle 431 on reader service card

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Market Share
Windows Illustration
Software

PC Data,
December Sales, 1994

CorelDRAW NUMBER ONE in ILLUSTRATION

Company	Units	Sales
CorelDRAW	76,091	1,586,519.83
Adobe	257	73,968.64
Micrografx	380	36,696.38
Deneba	98	15,899.24
Totals	8,344	1,713,083.90



The results are in!

CorelDRAW is the #1 choice for PC users. Year after year, survey after survey, CorelDRAW continues to dominate the illustration market with the best graphics software available.

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Corel VENTURA® NUMBER ONE in PUBLISHING

Product	S.L.P. (US\$)	Score
Corel VENTURA 5	\$595	6.8
QuarkXPress	\$895	6.7
Aldus PageMaker	\$895	6.2

INFOWORLD
Report Card Rating,
Desktop Publishing Software
March 20, 1995

3.5" disk version



Corel PHOTO-PAINT® NUMBER ONE in IMAGE-EDITING

Product	S.L.P. (US\$)	Overall weighted score
Corel PHOTO-PAINT 5 Plus	\$249	44
Micrografx Picture Perfect 5.0	\$595	42
Adobe PhotoShop 3.0	\$895	39
Fractal Design Painter 3	\$499	38

PC World,
Best Buy Award,
April, 1995

3.5" disk version



Corel VENTURA 5 and Corel PHOTO-PAINT 5 Plus are also available as standalone products



* Available as standalone products.

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Just don't have the time for power problems on your PC? Don't worry. They'll always make the time for you. It's not if a power problem will occur, but when. Due to household appliances, poor wiring, bad weather or even other office equipment, power problems are as inevitable as death and taxes.

IN THE NEXT THREE MONTHS, MORE THAN 30,000,000 PCs WILL BE HIT BY POWER PROBLEMS...

In fact, you have better odds of winning the lottery than of escaping the sting of power problems on your PC. One study discovered a typical PC is hit over 100 times a month, causing keyboard lockups, hard drive damage, and worse. And since sags and blackouts represent more than 85% of power problems likely to

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hit your computer, standard surge suppressors are literally powerless to protect you. And a study in a recent PCWeek showed that the largest single cause of data loss is bad power, accounting for almost as much data loss as all other causes combined.

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Don't take chances...
Invest in protection...
from APC... PC Week

OVER 3,000,000 SATISFIED APC USERS...

"This is the best computer related purchase I have ever made! Has saved me hours of re-programming..."
Carol Irvine, Wizard Assoc.

"We reduced our maintenance costs the first year by 50% in repairs of equipment."

Valentin Gonzalez, Pfizer

"Our server was running a project when it lost power... messed up all the data files. It took four days to recover. But we don't worry anymore since we got APC..."

Tomy Chen, DeAnza Systems

"We were working on a state bid when the power went off. APC saved the day and year and future... about 800 pages of data saved thanks to APC."

Ravi Iyer, Software Galleria

"A power surge did significant damage to all of our systems except those protected by APC. The APC units were undamaged..."

C. Jeffrey, C. Jeffrey Eng.

"APC has virtually eliminated downtime in our corporate network..."

Kurt Roemer, Searle Corp.

"Power went out while processing payroll! If not for APC we would have had a walkout!"

Suzi Higgason, OSI Inc



Home office user Don Traux knows first hand about APC reliability. "It ought to be against the law to buy a computer without an APC. Back (UP) 250! I recently had a direct lightning hit right outside the house... my computer never blinked."

"APC lets me sleep better at night. How much would you pay to get back that one file you worked all day to complete for the boss who gets on the plane at 8:00 a.m.? You should assume that you'll buy a UPS, not that it's some luxury item."

R. Morella

"A power surge wiped out the FAT tables on all PC's not protected by APC. Now have APC installed on all..."

Craig Post, Comm. Tech.

"Before I purchased the UPS I had to put in at least two hard drives at \$1000. With APC products... no new hard drives in two years!"

S. Foreman, LSP

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Read Only

REVIEWS OF THE LATEST BOOKS FOR THE PC USER

Edited by Tin Albano

Connecting to Your Government

BY SUSAN GREGORY THOMAS

Consider this: Just a few years ago, we had a president who was awestruck by supermarket check-out scanners; now, we have one who regularly checks his e-mail. Whatever else you may think of the current administration, you've got to admit that it has brought government up to speed technologically, making once-privileged information available on-line. Unfortunately, it hasn't done a great job of advertising how or where to find this information. Luckily, Bruce Maxwell's new book—*Washington Online: How to Access the Government's Electronic Bulletin Boards*—does.

Washington Online is the Lesko's Info-Power for the on-line world: a guide to getting free information from the federal government. To make for easy searching, every bulletin board is listed alphabetically by subject, from agriculture to transportation, instead of by government agency or administration. A handy source for journalists, grant-writers, statisticians, not-for-profit careerists—indeed anyone seeking hard-core federal data—*Washington Online* provides lucid explanations of what each board offers and how to access them.

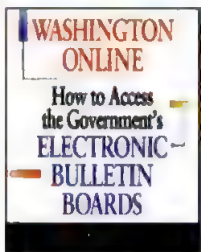
Some boards, of course, are better than others. *Washington Online* covers the resources available on such useful boards as the friendly FedWorld, a

clearinghouse for the National Technical Information Service as well as a gateway to more than 100 federal government boards, and the Consular Affairs Bulletin Board, offering Ameri-

cans abroad everything from updates on international political events to passport and emergency services. One of the neatest boards listed is NASA's Spacelink, which provides details on

past and present space missions as well as satellite images of Earth.

Washington Online is, however, intentionally incomplete.



READ ONLY RECOMMENDS



If you're thinking of making your own multimedia CDs, think about first getting the *Official Macromedia Director Studio*, by Tony Bove and Cheryl Rhodes. It's packed with everything you need to know about the leading cross-platform multimedia-authoring tool. And if you get the book, you get the software.

\$40.00; Random House Electronic Publishing, 800-793-2665; ISBN: 0-679-75321-4.

To qualify for inclusion in the book, each board had to be free, available to the public, and either operated by the government or a major source of government information. There are, therefore, no listings for boards operated by federal courts, government watchdog groups, or the CIA's covert-operations division.

Unintentionally perhaps, *Washington Online* makes clear that, technological advancement aside, the federal government is

still, well, the federal government: Accessing their boards is not always easy or inexpensive. These shortcomings are hardly the fault of the book, but rather make clear that the information superhighway is still far from clearly marked.

Washington Online: How to Access the Government's Electronic Bulletin Boards, by Bruce Maxwell, \$19.95. Congressional Quarterly Inc., 800-638-1710; ISBN: 1-56802-000-7.

Circle 458 on reader service card

Uncovering On-Line Sex

BY GAYLE C. EHRENMAN

Admit it. You know it's happening—somewhere out there. But you may not be sure where, or how, or even how vast the options are. And you're ashamed to ask. Fear no more. With *net.sex* in hand, you can embark on a guided tour of the seamy side of the Internet.

Author Nancy Tamosaitis attempts to tackle the vast world of sex on the Internet with a two-pronged approach. The first third of the book is given over to a scholarly discussion of what constitutes cybersex, its legal ramifications, and most importantly, who's doing it and how much they know about sex. The rest of the book gets down and dirty with a discussion of the var-

ious sex-related Usenet groups, a look at Internet Relay Chat (IRC), and other virtual worlds where one can find adult entertainment on the Net.

The bulk of the book's scholarly portion is devoted to results of the Kinsey Institute's National Sex Knowledge Test, the first comprehensive survey of people who participate in sex-oriented groups on the Internet. This section, coauthored by researcher Tony Dubitsky, provides easy-to-read charts, tables, and text analysis of the test results as well as a copy of the survey questions, so you can play along at home. The information here is presented in a

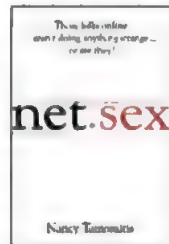
straightforward, analytic style that differs greatly from the tone of the remainder of the book. And that's the major shortcoming of *net.sex*.

Tamosaitis handles the chapters on the various sexually oriented Usenet groups with a wittier, more sarcastic and graphic style. These chapters are alternately entertaining and disturbing, but always interesting for those with a voyeuristic bent.

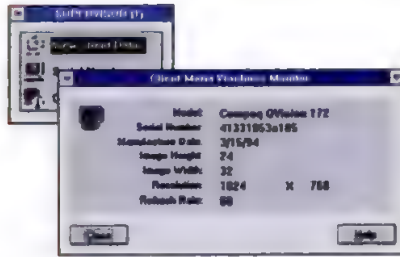
The two sections of *net.sex* are both well-written and interesting. They just don't work to create a cohesive whole.

net.sex, by Nancy Tamosaitis, \$22.95. Ziff-Davis Press, 800-688-0448. ISBN: 1-56276-285-0.

Circle 457 on reader service card



COMPAQ



You walk from office to office making lists. Lists of serial numbers you

had to reach behind a desk to get. Lists of who has what hard drive, and which monitor is sitting where.

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At first, it might seem odd that the extra staff you hire comes in the form of a computer.

But then again, what else would you expect from a computer company?



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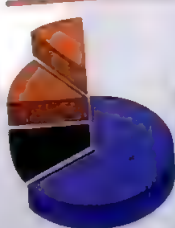
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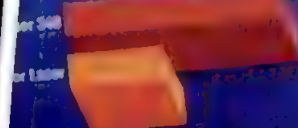
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Michael J. Miller

Suite Renovations

If you think today's office suites are simply collections of programs that look alike, Lotus, Microsoft, and Novell have news for you. These three companies want to turn their suites into platforms that can be used for the development of new applications and

allow for other vendors to build plug-in components. Instead of a series of connected rooms, these suites will grow to be hotels.

Each of the three major suite vendors is taking a different approach to its next generation of suites. Lotus is emphasizing "working together" and Notes integration. Novell continues to talk about "groupware," but with an emphasis on a tighter connection to NetWare. And Microsoft is accenting the connection between its office suite and Windows 95. Let's check into each suite and sample the accommodations.

THE LOTUS POSITION

Lotus has worked so hard and has been so successful at promoting its Notes groupware platform that people wonder whether the company still cares about its desktop applications. In fact, Lotus is about to unveil some of the biggest changes in its desktop applications in years. Lotus wants to extend its groupware position into the suite market, both through its NotesSuite, which combines SmartSuite with Notes, and by making its desktop applications stand out through "Team Computing."

Consider Word Pro, Lotus's first major upgrade in several years of its word processor, formerly known as Ami Pro. Word Pro will ship first for Windows 3.1 this summer, then for Windows 95 shortly after the operating system is released. Where Word Pro stands out is in its group features. Most of today's word processors let you mark revisions for an editor to accept or reject. Word Pro goes beyond this with a feature called Team Review, which lets multiple people edit a document over a network or even by floppy. Then Team Consolidate lets you combine multiple edited documents

into a single document.

Other products in Lotus's SmartSuite are evolving in a similar manner. For instance, 1-2-3 will add a Team Consolidate feature with which users can collect multiple sheets into a single spreadsheet. And an upcoming version of Freelance Graphics will add TeamShow, the ability to give a presentation over a network.

Lotus plans to add more features common to all of its applications. Look for a common "infobox" for changing the properties of different parts of applications (with tabbed dialog boxes that look right at home in Windows 95) and a common scripting language called LotusScript. And each program will have SmartMasters (building on the "click here" ideas used in Freelance Graphics).

Lotus also plans to ship versions of WordPro, 1-2-3, and Freelance for OS/2 Warp with the same feature set and a user interface customized for that platform shortly after release of the Windows 95 equivalents.

MICROSOFT'S MISSION

It's not surprising that Microsoft is looking at exploiting Windows 95 in the next version of its suite, called Office for Windows 95 (due out when the operating system ships). All Microsoft products are being upgraded and getting the "for Windows 95" name instead of version numbers. The existing versions of Microsoft Office 4.2 and 4.3 will stay on the market for Windows 3.1 users.

All of Microsoft's office applications will take advantage of the Windows 95 user interface, including tabbed dialog boxes, properties, etc. Word and Excel are retaining the same file formats as the previous versions, although both are being made 32-bit and will



*Lotus, Microsoft, and Novell
want you to check into their
Windows 95 suites.*

Michael J. Miller

support multithreading for some functions. Word is offering major enhancements to its AutoCorrect and AutoFormat features. And Excel users will notice that the biggest change will be the boost in performance. Microsoft claims a 30- to 50-percent performance improvement in recalcs and the ability to use a lot more data more quickly in its pivot table feature.

Microsoft is adding Schedule+ to Office 95. Formerly available with Mail or in Windows for Workgroups, Schedule+ has been enhanced so that it works as a personal scheduling application as well as a group scheduler. It can send meeting requests through most mail systems and send project status reports to Microsoft Project.

The biggest changes are at the application integration level. All the products will have new File Open and File New commands that focus on performing specific tasks, extending the template concept dramatically. (In some ways, this is similar to Lotus's SmartMaster ideas.) Most impressively, all products will

share the same spell-check engine, including the AutoCorrect feature. Each product will also feature an AnswerWizard, a natural language-based help system where you type a question and the AnswerWizard tries to answer correctly, even if you use different words than the programs use.

Microsoft continues to push Office as a platform for development, with an emphasis on Visual Basic, Applications Edition (VBA) and programs that can be scripted via OLE. VBA has been added to Access in addition to its earlier appearance in Excel (and Project).

NOVELL'S NETWORKING

Having only recently released PerfectOffice, its latest suite for Windows 3.1, Novell is understandably a bit more reticent in describing its Windows 95 applications. It points to many features in the existing suite where Novell is ahead of competitors. These include the integrated mailbox already in GroupWise; advanced grammar checking in its word processor; its Envoy portable document technology; and PerfectOffice's QuickTasks, which lets you create an editable macro that works across WordPerfect, Quattro Pro, Presentations, and GroupWise.

As it moves toward Windows 95, Novell plans to continue improving the integration of its suite's different applications with more shared components. Novell plans a large expansion of common dialog boxes, better integration with Paradox, and an expansion of its Coaches.

Novell is taking a very different approach from Lotus, integrating network functionality into its suite. For instance, QuickTasks already let you do things such as change network passwords or delete items from network print queues. Moving forward, expect to see tighter network integration, such as the address books of the InfoCentral PIM and GroupWise converging on using the Novell Directory Services used in NetWare 4.1. Novell plans to implement several functions with multithreading, and says by moving to 32-bit applications it will increase the speed of functions such as mail merge by as much as 50 percent.

As you can see, each vendor plans to add more to its suite and to build on its existing strengths, respectively Notes, Windows, and NetWare. The results will be suites that have the same basic application components but very different views of the world. □

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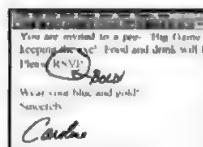
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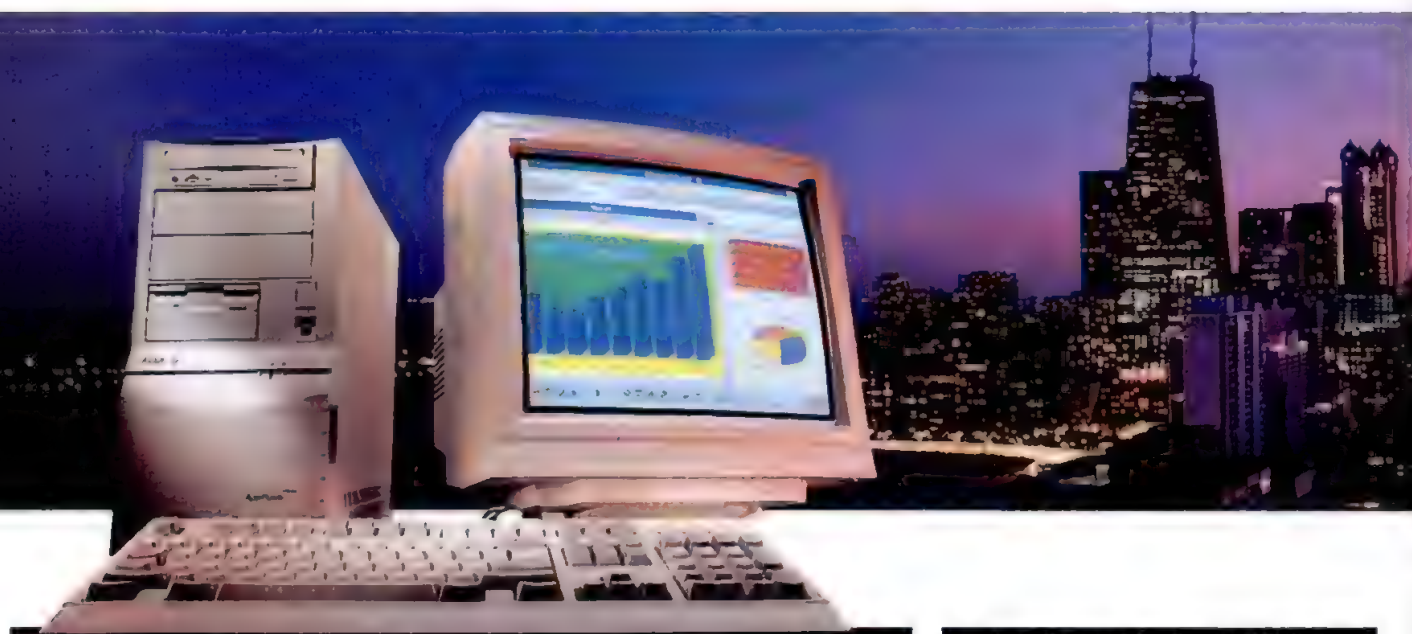
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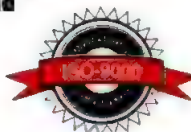
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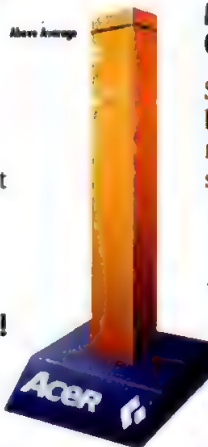
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Bill Machrone

ISDN for the Masses? Not Quite

I have an ISDN line—and you (probably) don't. That's a pretty safe bet, since only half a million or so are installed in the country. Getting an ISDN line wasn't easy. In fact, it took almost a year from the time I ordered the line to the time I got it working.

Let me tell you of some of the travails.

ISDN was tariffed on January 1, 1994, in my state. Intending to run Intel's ProShare videoconferencing system, I placed my order. Or at least I tried to. What followed was the usual sad tale of missed deadlines and lost work orders, and also a passive resistance to the phenomenal expense of installing the first ISDN line in our area. For the tariffed price of \$175, the phone company had to run 3.5 miles of fiber, install a SLIC (subscriber-line interface card), condition a line, and run the wire to my den. After nine months' delay, it ultimately came down to an Intel vice president calling a Bell Atlantic vice president and saying, in essence, "I thought we had a deal here."

Six weeks later, I had my ISDN line. ProShare worked fine, but I really wanted fast Internet access. I'd been using Netcom as my Internet provider, but it hadn't come through with ISDN access. A few weeks later, I got a 3Com Impact digital modem, which includes the ISDN line terminator, Hayes command-set emulator, and analog line breakout, all for under \$500. I switched my Internet provider to PSI (800-774-3031); its InterRamp starter kit is supposed to get you onto the Web in 5 minutes flat.

The InterRamp documentation, however, said that it didn't support the Impact modem, so I called 3Com (908-721-1337) to find out which access provider I should use. The rep laughed and said, "They'd better support us—they sell our box!" Her advice on the configuration got me part of the way there, and a call to PSI got me the rest of the way.

PSI's kit includes NetManage's Internet Chameleon, which provides the TCP/IP stack and sockets for Windows apps. It's regarded as more robust and easier to configure than Trumpet Winsock, the public-domain stack. I

didn't like the Chameleon browser, so I downloaded Netscape from the Public Brand Software forum. Neither of them holds a candle to NaviSoft's browser. (Check it out at www.navisoft.com.)

If you haven't had the pleasure of making a data call on an ISDN line, you're in for a treat. You tell it to connect and 2 or 3 seconds later you're in. It's all digital, so you don't hear any of the beeps, swooshes, or other sounds endemic to modems mating. The Web comes to life at 64 Kbps in a way that just isn't possible with analog modems. The graphics come flowing in quickly, and multimegabyte downloads take only a few minutes. This erases, somehow, the months of waiting. So here I sit in digital bliss, surfing the Web and enjoying the heck out of it. Who could rain on my parade? The FCC, that's who.

In its infinite wisdom, the FCC has decided to change the billing structure for ISDN from a per-ISDN-line basis to a per-subscriber-line basis. One ISDN line, you see, can give you two phone lines. Or one digital and one analog line. Almost no one buys an ISDN line in order to get two phone lines. People buy ISDN lines because they need fast, digital access to data. The FCC, charged with the responsibility of guiding us into the digital future,

apparently wants to nip the ISDN revolution in the bud by doubling the rates in the name of not giving anyone an unfair bargain on phone rates. Bell Atlantic has filed a waiver petition, but as of this writing, the FCC has not reconsidered its decision.

To my knowledge, Bell Atlantic and Pacific Bell are the only RBOCs that have filed such a petition, indicative of their aggressive commitment to ISDN. This is the same Bell Atlantic that stonewalled me for the better part of a year. Let's hope the change in attitude is companywide and spreads to the other RBOCs. □



Okay, I'm an elitist when it comes to ISDN technology. But I'd love some company.

Triton Pentium

ThunderBrick



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Second Looks

LIVING WITH THE PRODUCTS WE REVIEW

WordPerfect for Windows? Hardly

I didn't want to get into database publishing, but I may have to in order to convey all that readers are finding wrong with WordPerfect for Windows 6.1. One reader's travails: "Today alone, WP has deleted 30 pages of one of my documents, added subdocuments to a subdocument (a *very* bad thing to have), hung twice, added a horizontal line with some gray spooze at one end (but just to the display, not to the document), highlighted lines that were not part of a marked section, added little boxes to the end of paragraphs that were of a particular heading style, had a GPF, and been unable to establish a solid DDE link with MS Project."

I don't know what spooze is, but it doesn't sound good. Another problem: Try generating a table of contents in "Typeover" mode. It

screws up royally.

More comments:

"If you add a bitmap to a WPWin document, you get a bloated document in terms of file size. When you delete the bitmap, the file remains bloated."

"If you run a macro from the floppy disk drive, then every time you restart WPWin 6.x, you get a

message box saying drive a: is not ready. The only way to fix this problem is to run a macro from the hard disk. WordPerfect insists it is a 'feature' and not a bug. WPWin 5.x doesn't do this, nor does any other program I've used. This 'feature' appeared in WPWin 6.0 and continues in WPWin 6.1."

I've had some on-line arguments with readers over which is buggier, WinWord or WPWin. I concede; WPWin wins. Even the loyal fans have their problems. As one reader said, "A truly fabulous product! Only two small complaints..."



Toshiba's Portégé Lasts And Lasts and...

And what's not to like? A great color screen, terrific battery life, small size, light weight, and a pointing device that is becoming the standard for subnotebook ease of use. Our own Bill Howard says, "I'm sure you can replace the battery, but I never bothered to find out how. It lasts the whole day."

One feature could stand a redesign: The power switch is a push button on the machine's side. Several users complained that the machine switches itself on while inside brief-



cases and laptop bags. Then they're greeted by depleted batteries. One reader had exactly the same experience with a Toshiba-built cellular phone that switched itself on in his pocket. Let's hope Toshiba remains competitive with 10.4-inch screens, bigger disks, and faster processors.

How to contact Second Looks: On ZiffNet type GO ZNT:EDITOR, and choose Views: Machrone. Contact Machrone directly via MCI Mail at Wmachrone or CompuServe at 72241,15. You can also find us on the World-Wide Web at <http://www.ziff.com/~pcmag>.



X-Jack Is Adapting Splendidly/Terribly

Megahertz's widely acclaimed X-Jack lets you use standard RJ-11 modular connectors, so you're never in danger of losing the cumbersome dongle adapter. Many laptops, however, stack their PCMCIA slots. If one slot happens to hold a network adapter or other device that needs a cord, the phone line's vertical entry through the X-Jack is sure to interfere.

Readers were emphatic about both viewpoints. I've been using both the Megahertz and the X-Jack-equipped Practical Peripherals PCMCIA cards (with technology licensed from Megahertz) and understand the problem. On my Gateway Liberty subnotebook, the phone cord sticks up an inch away from my right wrist and I often hit it. The X-Jack seems rugged enough to take the wear, but I've put a crimp in the wire to hold it out of the way, and I use the lower PC Card slot to make the wire less of an obstacle.

Whether you're selecting PC Card peripherals or a new laptop, pay close attention to how it all works together. I'm just glad I don't have the interference problem. I'd hate to start carrying a proprietary cord again.

LOOKING AHEAD

Tell me what you love and hate about these products and we'll share the information in future issues.

Autodesk 3D Studio	Quad-speed CD-ROMs
Diamond Stealth 64 Video	Vortisoft Remove-It
IBM ThinkPad 755CD	Compaq Presario
LANtastic for OS/2	WordPerfect 6.1
PCMCIA modems	ZDS Z-NoteFlex

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N700, DX4/75, 10.4" color DSTN, 520MB HDD, 4 MB RAM	\$2,349
N700, DX4/75, 10.4" color DSTN, 520MB HDD, 8 MB RAM	\$2,528
N700, DX2/50, 10.4" color Active Matrix TFT, 340MB HDD, 8 MB RAM	\$2,878
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ZEOS: Sweet Deal

VS.

Toshiba: No Big Deal.

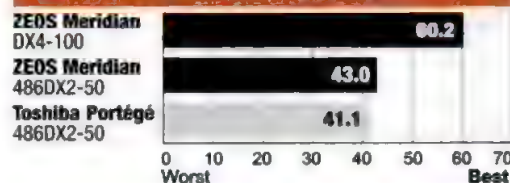


Unretouched screen photos.

	ZEOS Meridian 400A	Toshiba Portégé
486DX2-50	CNI \$2995	\$3399*
DX4-100	CNI \$3395	Not Available
Features		
Size	► 7.8" x 10.2" x 1.7"	► 7.9" x 9.9" x 1.8"
Weight	► 4.1 lbs	► 4.4 lbs
Hard Drive	► 350MB	► 250MB
Memory	► 8MB, upgradable to 20MB	► 8MB, upgradable to 24MB
Floppy Drive	► External 3.5" FDD	► External 3.5" FDD
PCMCIA slots	► 2 Type II	► 1 Type II
Video	► 1MB local bus	► 1MB local bus
Screen	► 7.8" active color, .25mm dp	► 8.4" active color, .27mm dp
Keyboard	► 84-key w/embedded numeric keypad & 12-dedicated function keys, inverted "T"	► 82-key w/integrated numeric keypad & 12-dedicated function keys, inverted "T"
Pointing device	► Integrated TruePoint	► Integrated AccuPoint
Ports: Serial/Parallel Mouse/Keyboard Floppy drive VGA video	► 1 (16550 UART) /1 ► 1 for either ► 1 integrated ► 1 integrated	► 1 (16450 UART) /1 ► Req. port replicator, \$239 ► 1 integrated ► 1 RGB, req. adapter (included)
Battery	► Replaceable, rechargeable NiMH	► Replaceable, rechargeable Lithium-Ion
Software	► MS-DOS 6.2, WFW 3.11 Lotus Organizer	► MS-DOS 6.2, WFW 3.11 CommWorks™ for Windows, MaxTime, Fn-esse™
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The ZEOS Meridian 400A is "a threat to Toshiba and its premium Portégé for top rank in the subnotebook market," according to *Computer Shopper*. Threats are idle unless you have the power to back them up. The Meridian 400A is a mighty powerful bundle packed with features at a minimal price. Case closed.

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*Toshiba Portégé price quoted as of February 23, 1995. Benchmarks test run with PC Bench 9.0. Purchase orders are subject to approval. Business leasing programs available. All prices, specifications and availability are subject to change without notice; call to confirm these and warranty details. Prices do not include shipping. All products and company names are trademarks or registered trademarks of their respective holders. Intel Inside is a trademark of Intel Corporation. ZEOS is a registered trademark. Z-Card is a servicemark. ZEOS Meridian is a trademark of Micron Electronics, Inc. (c) 1995 MEI ZEOS International, 1301 Industrial Blvd., Minneapolis, MN 55413 USA. Micron Electronics, Inc. is a publicly traded company (NASDAQ symbol: MUEI) ZYT-PC01-95006

CIRCLE 125 ON READER SERVICE CARD



John C. Dvorak

Is Bob Really a Kidsworld?

Microsoft Bob, I believe, is not destined to become a commercial success. It has an odd aura about it that may hurt sales. Its name is weird, its concept is peculiar, and it borders on being a who-needs-it program. Worse, Microsoft doesn't seem

fully behind it. Only the folks in the Home Division are jazzed about it, and they seem defensive.

But in fact, Bob is the most unique user interface ever introduced to the computing public. I found it uninteresting and beside the point until my 9-year-old son decided to test-drive it. This boy is very particular about what is good and what is bad, and, as you can imagine, he has plenty of computer toys to play with. As a background, he is thought to be the youngest power user of the image program KPT Bryce. He was doing elaborate renderings with the program at age 8, much to the amazement of HSC Software's Kai Krause, who is probably today's most respected computer artist/programmer. The point is that the kid is no slouch when it comes to product evaluation, and I have to respect his judgment despite his age. Bluntly put, he loves Bob.

I thought he'd hate it, since he doesn't need a front end to work with a computer. But I, like many adults, am probably missing the point of this program. I have to admit I was stunned by the unexpected screens that crop up in Bob once you get deep into it.

Day after day, my son maneuvers around his Bob house and adds more and more outside programs into the Bob framework. He turned his America Online account icon, for example, into a stylized art object that has the AOL logo emblazoned with a modern flourish. My son imports one item after another into Bob, and the program is now like an elaborate, customized house, with secret rooms and hidden entrances.

Children like a sense of privacy when it comes to just about everything, and computing is no exception. Bob is very private. Besides the elaborate password protection, Bob's overall environment is very much like a kid's clubhouse. Kids love

clubhouses, and the Bob clubhouse can be customized to suit their own tastes.

The problem is, Microsoft would have adults using this thing, when it is obviously a more appropriate tool for kids aged 7 to 14. First of all, it uses cartoon characters as guides, and most adults do not respond well to cartoon characters. Second, it has the appeal of a game. And when working, most adults do not want to play games.

Bob qualifies as a game because there are lots of cool things you can do to each and every object in all of Bob's rooms. And you can change the rooms in nearly an infinite variety of ways. For children, Bob offers uncharted territory to explore and build upon.

The Bob hype-mongers say it's for novices and minimally experienced PC users who need a friendly front end to keep from freaking out over some odd prompt or dialog box. Now seriously, does anyone at Microsoft really expect some guy at his desk at Price Waterhouse to have the Bob front end up and running? "Hey guys, look at this neat user interface!" I mean, the man is up for immediate dismissal at this point. It's like wearing a T-shirt with the word *dumb* emblazoned on it and an arrow pointing up at your head. It's not going to fly. Furthermore, nobody but a kid

has time to explore the depths of Bob.

Bob has redeeming features. It's a product with a \$69 street price that will keep a child occupied for weeks, maybe even years. Compare that with most CD-ROMs, no matter how they are marketed. The rule is: 2 hours of boredom, and it is never used again.

In Bob, Microsoft has a product that's as important as *Myst*, *DOOM*, or the company's own *Encarta*. But we have to still tell the silly rabbits at Microsoft that *Trix* are for kids. So is Bob.



*For children, Bob offers
uncharted territory to explore
and build upon.*

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CIRCLE 906 ON READER SERVICE CARD

Inside Track

M

ore Ideas from Intel Dept.: First the buzz centered on Intel's NSP (Native Signal Processing) architecture, and now it concerns the company's **Universal Serial Bus (USB)** architecture. This idea is

similar to the ADB (Apple Desktop Bus) used to connect the mouse, the keyboard, and a host of varied peripherals to a Macintosh. While analysts are saying that this 12-megabit-per-second data pipe could eventually replace the RS232C serial port, I suspect the two will coexist for quite some time to come. The USB can **daisy-chain** up to 64 devices together (one being the host computer). So it's more of a competitor with SCSI than anything else.

This assumes that the Intel-led consortium actually uses the technology. Intel sure **hopes** that this idea—along with other chip-gobbling concepts—booms, because the use of the universal serial bus has a lot to do with utilizing some of the **chip-making capacity** that Intel has been accumulating. Understanding this is the key to understanding why offbeat new ideas such as NSP and USB, as well as Intel desktop video and other yet-to-be-announced technologies, will proliferate.

With almost each CPU iteration, Intel has had to build a new fabrication plant to facilitate the semiconductor process improvement required to build the new generation of processors. As we've progressed deeper into the world of submicron processes, Intel has had to find something to do with its old fabrication plants. While they're not state of the art, they can pump out many and varied controller chips. Even as companies like Motorola keep pumping out old technology such as funky 68000s for cars and home video games, Intel's strategy has been to abandon its cash cows and storm ahead with new expensive products. The Motorola 68000 sells for about a dollar, by the way. The hottest Pentium may cost \$500 to \$1,000 per chip. **Big difference.**

To use all the old fab plants, Intel is dreaming up new ideas that will require new chips, which can be made in the old fab plants. Where it ends, nobody knows, but **expect a lot of announcements.**

Two Chickens in Every Pot, Two Gigabytes on Every Computer Dept.: A few columns back I discussed how the gigabyte drive will be selling for \$299 by the end of this year. I mentioned this to some drive makers, and **they laughed.** The way things are going, they told me, the drives will appear by the end of the summer. Look for the new high-end standard drive to be the 1.6GB drive.

Windows 95 is a November product. At least that's what

I was told by someone "close to the programmers."

More likely, Microsoft will roll out Win 95 in August and follow it with the Win 96 patch, which I'm told is nearly done.

Western Digital was the first to promote this size. The fact that such high-capacity drives are available inexpensively has caught users off guard, I believe. There is no reason not to have at least a gigabyte at these prices. This is like the modem revolution. A 28.8-Kbps modem is now available for less than \$200. The first 19.2-Kbps modems were about \$2,000 each. This is **amazing** technology for these prices.

It's Hard to Tell Fact from Fantasy Dept.: Now I hear that **Windows 95 is a November product.** At least that's what one fellow "close to the programmers" told me. The more likely scenario is as follows: Microsoft rolls out Win 95 in August. It then shines on all support calls until a month or two later, when

it rolls out something called **"the Windows 96 patch,"** which I'm told is nearly done. This rumor, which comes from Europe, confirms something I heard last year, which had it that Microsoft was going to prepare a "bug fix" to be distributed immediately after the initial rollout of Win 95.

Some of the cynics among us feel that this two-step approach is sneaky. Of course, there will be some offbeat bug in Win 95 that will be discovered just as the Win 96 patch is finished and shipping. It just seems to me that Microsoft is in one heck of a hurry for no apparent reason.

Hot tip: Makers of video cards all tell me that the software version of MPEG decompression will dominate the market in a few years. This means that the expensive hardware implementations we've seen recently will all fall by the wayside. Thought you should know.

Making Matters Worse Dept.: *Playboy* is going to do a pictorial called Women of the Internet. Gads. Although I have personally wondered what kind of computer **Pam Anderson** uses.

Genuinely Interesting Hardware Dept.: Have you gone to a large department store and seen that odd-looking Timex watch with the Microsoft Windows logo on the band? Let me tell you that this is one cool (albeit nerdy) watch that should be getting more attention. And it's the watch that Bill Gates wears; hero worshippers take note. In addition to telling time, it's a computer that has a lens that **sucks up bar-code-like information** that is **flashed** from your computer screen. You keep a database of phone numbers, appointments, and reminders on your desktop machine. When you want to update the watch, you hold the watch in front of the screen and the screen **zaps** the watch with the data. It works like a charm. **Highly recommended.** The retail price is \$139, so expect to pay something less.

It's the only watch I know of that comes with a diskette! It's *très* cool. □

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CIRCLE 248 ON READER SERVICE CARD

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Jim Seymour

Stick a Rainbow in Your Bag

If you're like me, the last thing you want to do is start stuffing more things into your notebook-computer carrying case. I'm more interested in getting things *out* of there, not adding more.

Especially now that we've got full-function notebook PCs down

to about 4 pounds, which is the limit for a machine I want to lug around, I'm getting sensitive to every extra ounce of add-on weight.

Recently, though, I added something to my notebook case that's half the size of my notebook and adds another 3 pounds to my carry weight. That's bad enough. Worse, it's a *printer*, which I've often argued against carrying. Worst of all, it's a *color* printer—and I'm the guy who's always going on about how bad small color printers are.

No more.

LOVABLE LUG

I've been traveling with Canon's new little printer, the BJC-70. It's about the size of a tallish hardbound book and weighs exactly 3 pounds 4 ounces, which includes its built-in nickel cadmium batteries. That's bigger and heavier than I'd like, of course: I want a portable printer about half the size and weight of this magazine. But for now, it's small and light enough. Why? Because I'm knocked out by its print quality and, mea culpa, by how useful I'm finding a traveling printer to be.

I've long argued that lugging a printer around with you is unnecessary. It's easy to fax a document you need on paper to yourself at your hotel or client's office. If it comes in on thermal paper, slap it on an office copier and you've got a true plain-paper "printout." You have to make some compromises, of course: the lower resolution of faxed documents, the time involved, and the expense if the hotel charges for incoming faxes.

True, all of it. But these days, it's also sometimes pretty easy to connect to a client's LAN for a while and use that network's printers.

But, but. . . those are messy solutions, you complain. The output may look

bad. And what about color? How can you fax yourself some new overhead transparencies when you discover the night before a presentation that you've got to change some numbers in a couple of key foils? And what if you're running that presentation electronically and need updated handouts of your changed "slides"?

Even so, portable printers have been so clumsy and often have had such poor output that toting one along with you became a last-ditch answer.

Have you seen the BJC-70? You can forget everything you know about small printers and especially about small color printers. This one packs a built-in sheet feeder, high-quality printing—both full-color and 350- by 720-dpi dead-black text printing on plain paper and your letterhead sheets—long battery life, 4-text-pages-per-minute speed, and a lot of *wow!* factor into a tidy case that's just 6 by 12 by 2 inches.

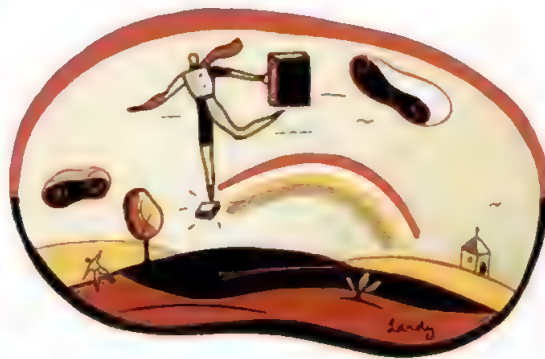
SOMETIME COMPANION

Actually, I haven't been carrying the Canon printer with me all the time. On quick out-and-back trips and when I've been very certain I wouldn't have any use for it, it's stayed on my desk. (It makes a very nice direct-attach

color-output printer for your networked desktop PC, by the way—for those times when you don't want to have to walk down the hall to pick up your printed pages, or when you need color, but there's no color printer on the network. At least not in *your* building.)

When I'm headed out for more than a couple of days, though—especially if I know I'm going to be setting up a de facto office in my hotel room or perhaps on a client's site while I'm gone—the BJC-70 goes in the bag.

There are other interesting small printers these

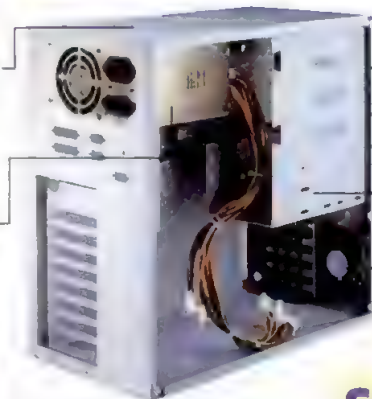


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you know about small printers.*

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CIRCLE 060 ON READER SERVICE CARD

Jim Seymour

days, of course, including new entries from Pentax and Citizen that caught my eye briefly. And there are a lot of good semismall printers, including the HP 310 and 320, which I've used for years. But they all pose compromises in print quality, such as requiring thermal ribbons or special paper, and they are just too large to carry, unless I plan to do a lot of printing.

I've also found that in most cities, I can rent an HP LaserJet III or IIIP for a week for under \$100, including delivery and pickup. If I'm planning to print a *lot* of pages, that makes more sense than carrying anything larger than the BJC-70; the speed and convenience of a laser printer make these short-term rentals well worth the cost. Of course, this really works only with single-destination trips. And it helps if you can plan ahead, though I've often been able to arrange delivery of a rented LaserJet on a couple of hours' notice.

Two weeks ago I used both approaches: I brought along the BJC-70 and also rented a LaserJet III for a few days. The team I'd joined was turning out a working plan for a client company's six-month, crash-it-through project. I put an auto-switching printer-sharing box on the table next to the LaserJet in the hotel conference room we'd commandeered with four printer cables snaking around to the edges of the table. Team members just plopped down their notebooks, plugged in, and printed.

At the end of the ordeal (even slick computer tools can't combat the exhaustion of four consecutive 18-hour days!), I knocked out some gorgeous PowerPoint overheads from our final draft and printed a few graphs on plain paper to slip into the printed copies for top management—all in color—on the little BJC-70.

A tip: With *any* portable printer, leave your heavy, stiff, parallel printer cable at home. Get a repair shop to make up a couple of 2- to 3-foot parallel cables from the thin, almost weightless flat-ribbon cable used to connect circuit boards inside desktop PCs. These cables weigh just a few ounces, and though they look fragile, they're very reliable if you take reasonably good care of them. In more than eight years, only two have ever failed me.

At a list price of \$399, the BJC-70 is one of the screaming bargains in the PC business. And it's good enough to change your mind about traveling with a printer.

It sure changed mine. □

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CIRCLE 257 ON READER SERVICE CARD



Bill Howard

Real Solutions to Real Problems

Interesting hardware crosses my desk all the time, some useful, some bizarre. How bizarre? A while back I got something called LapStrap, a clipboardlike device that straps to your thigh; you strap a laptop to it and type while sitting down. Of course, as

John C. Dvorak would say, you look like a dork. Here are some hardware accessories I've tried recently and for the most part liked. They all solve real-world problems.

Problem: CD-ROM storage. Solution: A plastic sleeve with a pouch in front for the CD and another in back for the instruction booklet. Voilà: Four CDs fit in the space of one jewel case. The wrong solution is an oak CD rack with slots for individual jewel cases—unless you consider that an important decorating statement.

The nicest sleeves come from Case Logic (800-447-4848). A three-drawer gray plastic cabinet with 200 sleeves (model PF-200) lists for \$99, individual sleeves run \$25 for a pack of 50 (PFR-50), and there are at least a dozen other options—including CD wallets for travelers. Note that 200 sleeves cost about \$100 list with or without the cabinet, but that's life. I also wish the back pocket was 1/8-inch wider; it's a tight squeeze wedging in a booklet.

Hunt Data Products (800-446-7823) makes Media-Mate CD Sleeves that aren't quite as fancy but are still serviceable. Twelve-packs are \$5.95 each.

Problem: Printing on the road without a printer. Solution: Carry your own printer cable. Usually you can find a kind soul who'll let you use a printer for a couple minutes, but you want to avoid the hassle of unscrewing the cable from the back of your benefactor's PC. All you need is a short, sturdy cable. The best I've seen is the \$19 Parallel I/O Cable C3061A from Hewlett-Packard (800-752-0900). It's 3 feet long—exactly what you need—with a right-angle connector at the printer end.

Problem: Juggling laptop and papers when you're not at a table. Solution: Lap Desk. Suppose you want to work on a spreadsheet and shuffle papers while you're sitting in an easy chair at home, or suppose there aren't enough places at the

conference table and you're sitting along the wall. Lap Desk, from Levenger (800-544-0880), is a 13- by 32-inch crescent-shaped plywood surface (cherry, \$39.95; maple, \$29.95) you can hold comfortably on your lap. Two garterlike elastic bands hold papers in place. I guarantee people will chuckle the first time you use this in the office, but it is useful. If you're handy in a wood shop, you could save a lot by building your own, although Lap Desk's special core makes it lighter than most plywood.

Problem: Little hands, big keyboards. Solution: A kid-size keyboard. The \$99 KidBoard, from KidBoard Inc. (800-926-3066), is a colorful (yellow, blue, and red) oval-shaped keyboard that looks like a happy face. The "A" key has a picture of an apple, "B" has a bear, and so on. Three included games help teach the alphabet to kids age three to eight, but even under-two-year-olds will enjoy pounding on the keys and seeing apples, bears, cats, and other things roll down a chute on the simplest of the games. Keys are regulation-size (19-mm), but the spacebar is offset a bit to the left and takes getting used to.

Problem: Entering business cards into your contact manager. Solution: Type them in by hand. I've used several business-card scanners in the past few months.

These clock-radio-size devices list for about \$250 and feed one card at a time; you can also buy just the software and use a flatbed scanner. It's impressive to see how they figure out which lines are the job title, the address, the phone number, and the e-mail address. But there still are so many mistakes that by the time you're done proof-reading and typing corrections, you could've typed the whole thing in by hand. You can read reviews elsewhere that say these are miracle devices and time-savers. My experience is: 'Tain't so. □



Solutions to PC problems can be as bizarre as a LapStrap or as practical as a spare printer cable.

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CIRCLE 073 ON READER SERVICE CARD

NETWORK EDITION

COVER STORY

NETWORK BACKUP

Flexing Your Backup Muscle



Commit to the exercise: Make backup a strong point for your network.

By John Garriss

People take backup software for granted. And why not? You submit your backup jobs, flip your tapes, and then you look for something interesting to do. But when it comes time to restore, your backup software takes center stage. How do you know it won't let you down? While a good backup package can help lead to a good night's sleep, a bad one might bring you severe headaches.

Illustration by Merritt Dekle



I always get excited when it's time to put the spotlight on network backup. Sure, there are plenty of people who give me that raised eyebrow "boring backup"

look, and I suppose that backup doesn't carry the same mystique and risqué qualities as, say, the Internet. But backup has a dynamic of its own.

JUST MENTIONING the word gets a rise out of network managers. Their eyes get a crazed look, and they're back in the trenches, talking about hard-fought backup battles or close encounters with disaster in which they emerged heroic.

NOW THERE'S NEW backup weaponry, the focus of our Cover Story—a new version of Legato NetWorker and a new product from Symantec called The Norton Enterprise Backup. We pitted them against the veteran ARCserve.

WE WANTED TO PULL in a Palindrome product also, as two of them have earned recent Editors' Choices in larger network backup roundups in the full run of *PC Magazine*. But we found the company in the midst of two exciting major upgrades.

WE'VE STARTED A NEW COLUMN, TOO.

Multiple Access is a round-robin column by the members of our network staff. We'll let you hear from each person in our pipeline, and we hope that we hear from you as well. This issue, Steve Buehler, director of PC Magazine Labs, West Coast, talks about kick-starting ISDN. Steve's one of the warriors who's survived the hassles of trying to get ISDN operational in his home for over a year. Steve's been tooling around the computing industry for 15 years and has been leading our Network Edition testing group at ZD Labs in Foster City, California, for 2 years. We're happy to introduce him to you.

—Gail Shaffer

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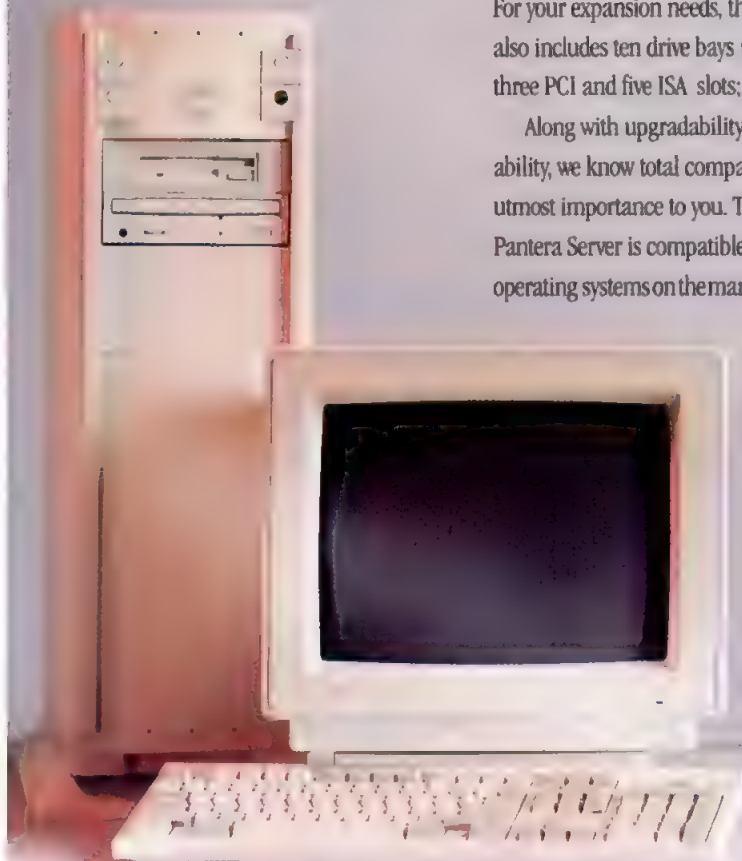
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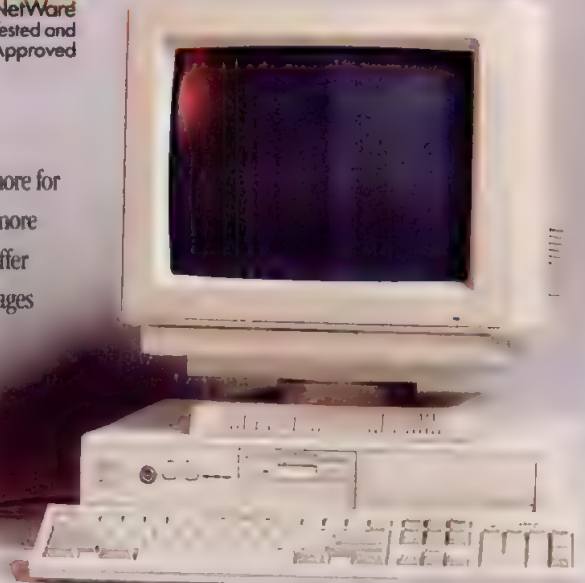
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CIRCLE 924 ON READER SERVICE CARD

So to make your evenings more peaceful, we looked at three packages designed to keep all your NetWare data safe and secure. The newcomer here is Symantec's The Norton Enterprise Backup (NEB). It went up against the recently upgraded Legato NetWorker 3.1 for NetWare, and an Honorable Mention from last year's product roundup, Cheyenne's ARCserve for NetWare—Windows Edition, Version 5.01. Our Editors' Choice goes to Legato NetWorker for NetWare, for the best combination of backup power and flexibility.

KEEP THE KITCHEN SINK

Most people don't need bells and whistles in a backup package. Their needs center on getting all their data onto tape and making sure they can get it back. Usually it's just a file or two, but occasionally we're talking about major disaster recovery. In either case, the key word is *preparedness*.

At PC Magazine Labs, West Coast, we performed both single-server and multi-system backups, followed by a series of selective restores and even a simulated full disaster recovery. The good news is that all three products successfully performed our tests with no data loss—in pleasant contrast to our backup roundup last year ("Performing Backup Magic," March 29, 1994).

In that roundup we tested some real clunkers: products that repeatedly failed in the middle of backup jobs, or worse, failed to restore data that they had backed up. This time, despite our best efforts to confuse the software—multiple nested folders, multiple NetWare name spaces, folders with hundreds of files inside—each package got the job done.

Suitability to Task: Network Backup

Network backup is a veteran category of software: You shouldn't have to worry about unpleasant surprises. You need reliability and flexibility.

For **scripting and automation**, we consider ease of use, and we look for detailed tape-rotation schemes. Better packages give full control in assigning the type of backup. We prefer a File Manager-like browser.

An **enterprise backup** package should back up a range of client OSs. NetWare 3.12 and 4.1 support is required, but we note DOS/Windows, Macintosh, OS/2, Windows NT (client and server), and Unix client support. We also

look at performance numbers and central console management.

For **selective restore**, the most important consideration is the ability to browse through both file directories and tape sessions, and to note easily all versions of any stored file. Wildcards are a necessity. We give extra points if the package lets users restore their own files.

Because **disaster recovery** is a first-time

process for most users, we insist on clear directions. Step-by-step documentation is mandatory, and we give extra points for helpful recovery utilities. The software must properly handle the Bindery and NDS. We look for packages that store catalog data along with each backup job.

SUITABILITY TO TASK

Product Name

Scripting and automation	Poor
Enterprise backup	Fair
Selective restore	Good
Disaster recovery	Excellent

Legato NetWorker 3.1 for NetWare

Three powerful, reliable network backup packages made it tough to choose just one. Each has

appealing capabilities, as well as trade-offs. In the end, we felt Legato NetWorker 3.1 for NetWare edged out the other two.

NetWorker is an extremely powerful and flexible package—especially for an enterprise network. Its performance was also excellent, and it does the best job of providing options for tape-rotation schemes.

We were impressed by The Norton



Enterprise Backup's clear interface (a Symantec Corp. hallmark) and its performance, especially on the Multiple-System Backup test. We also liked its provisions for protecting the backup database.

Cheyenne Software's ARCserve for NetWare is a mature package—certainly part of its appeal. It's got great restore facilities (but individuals cannot restore).

(see "DAT's Not All, Folks"). These products also support most QIC drives, as well as many high-capacity DLT drives.

Tape auto-changers are coming down in price as well. They automatically manage multiple tapes within a single system. NetWorker works with auto-changers without any additional cost, and Cheyenne offers an optional module for ARCserve to support auto-changers. NEB will also work with auto-changers, but only in sequential mode.

We're also keeping an eye on another trend in which managers are using CD-R (compact disk-recordable) drives for their network backups. CD-R uses inexpensive compact discs to store your files. You write to the CD until it's full, then you store it somewhere and put another one in. Right now the solutions on the market aren't yet well-suited for NetWare—CD-R vendors such as Young Minds and Meridian Data only let you back up your files using their own software, and those programs don't back up NetWare security information.

SMALL SITES, LARGE SITES

We also generated performance numbers, but only some of you will need to weigh the results. If you have to secure only a couple of NetWare servers with a gigabyte or two of data, you'll probably just run your backups at night. In that case, you should consider simplicity of operation, automated tape-rotation schemes, and full compliance with SMS.

If you're thinking enterprise backup, then your backup jobs may run the danger of interfering with normal business. In that case, you'll probably want a speedier package. We found NetWorker fastest on our Single-Server Backup test, but NEB proved the fastest on the Multiple-System Backup test.

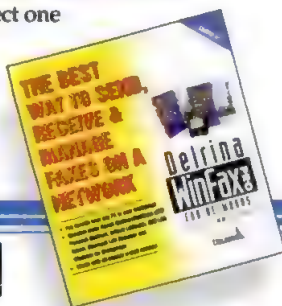


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CIRCLE 912 ON READER SERVICE CARD

Wherefore HSM?

People have been talking about HSM—hierarchical storage management—a lot more over the past year. HSM promises to provide everything from next-generation backup services to cost-effective multi-gigabyte storage management. But although HSM sounds great in theory, people are hesitant to adopt it in their real-world networks.

With HSM systems, files automatically migrate so that seldom-used data moves from your hard disk to cheaper media, such as optical disks, after a certain period of inactivity. If a user tries to access a file that has migrated, the file automatically migrates back through the HSM system to

the hard disk so that the user can open it.

HSM, however, is still perceived as complicated. For many, implementing a sound backup schedule is hard enough, and they would rather not introduce an unfamiliar new technique to their on-line storage system.

Backup vendors such as Cheyenne and Palindrome market HSM packages that help provide single-vendor support for both your backup and HSM needs. And NetWare 4.1 provides basic HSM services out of the box, with its High Capacity Storage System. These products may help change some minds, but for now HSM is moving more slowly than expected.—JG

The ability to back up other OSs is another consideration. NetWorker has been backing up Unix-based systems for years; on the other hand, it doesn't offer a Macintosh client. Of the three packages here, ARCserve offers the broadest range of client OS support.

If you have a large network, central man-

agement of your backup resources can save you time and energy. NEB does a good job here: It lets you break up your network into smaller domains, which can represent remote sites or subdivisions within your local site. You can then schedule and view backup jobs for all your domains from a single NEB console screen. While ARCserve and

NetWorker don't use the domain concept, they both use client/server architectures that allow you to log-on to and manage different tape servers from a single Windows administration program.

One more thing. Your package should be fairly simple to use. Backup software isn't rocket science, and with the advent of

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OR

ONE STEP BACKWARDS?

Windows it shouldn't be hard to design a program to let us schedule backups without scratching our heads in frustration. Anyone disagree?

Cheyenne Software Inc.

ARCserve for NetWare—Windows Edition

The veteran here, ARCserve takes the pain out of backup and restore. We were impressed by its combination of ease-of-use and features. It was not the fastest of the bunch, though.

Installation was easy, with one snag. Like The Norton Enterprise Backup (NEB), ARCserve for NetWare—Windows Edition, Version 5.01, required Bindery emulation login to our NetWare 4.1 NDS server. But the install program automatically creates both the server engines that reside on NetWare and the Windows client interface where you submit your backup jobs. ARCserve bundles agents for DOS and Micro-

SUITABILITY TO TASK

ARCserve for NetWare	
Scripting and automation	Good
Enterprise backup	Fair
Selective restore	Good
Disaster recovery	Good

As we went to press, Sytron Corp. (800-877-0016) had just started shipping ProServe CX 2.0 for NetWare networks. We had hoped to include a complete review of the new release in this article, but as it shipped it did not support NetWare 4.1 servers (although it did support NetWare 3.x and 4.0.x servers).

Major enhancements in the new version include an optional auto-changer module, improved media-rotation

soft Windows clients; Macintosh, OS/2, and Unix agents are available separately.

One concern is ARCserve's use of NetWare's bundled Btrieve database to store all of its information about backups. This approach caused us difficulties, making our client hang when we were exiting Windows. We later confirmed with Cheyenne engineers that the problem occurs when Windows tries to unload the Btrieve requester during exit.

Overall, though, ARCserve makes it easy to schedule backups. Its File Manager-like browser helps you configure jobs, and most people will use the built-in GFS

schemes, and a better user interface. For extra performance, ProServe CX lets you back up multiple clients simultaneously to a single tape drive. You can also enable software compression on clients and servers for quicker backups.

ProServe CX is designed primarily for small to medium-size NetWare environments. You can get a 10-client ProServe CX package for \$499; 25-client and unlimited versions are also available.—JG

(grandfather-father-son) tape-rotation scheme. You simply select the kind of backup you want—full, differential, or incremental—for each day of the week. You can save your scripts to an .EXE file and then run them directly from the command line.

A detailed activity log tracks all of your backup jobs. If you want, you can have activity reports sent via fax, e-mail, or to a printer as part of any job.

ARCserve does a good job on restore. You can view files by browsing either an integrated directory tree or individual tapes. ARCserve can display all the versions of

PERFORMANCE TESTS

Network Backup



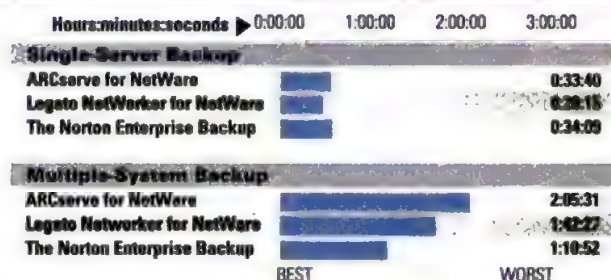
Your data is safe with any of the tested products. Each fully backed up and restored all our files without any data errors. Look to other factors to help you differentiate among the packages.

What the Numbers Mean

Each of the products finished first on at least one test, and all performed well enough in general. Legato NetWorker for NetWare was the fastest performer on our Single-Server Backup test, while The Norton Enterprise Backup (NEB), from Symantec Corp., proved extraordinarily fast on our Multiple-System Backup test. When backing up multiple machines, NetWorker and NEB each stream multiple sessions simultaneously onto a single backup tape. Cheyenne Software's ARCserve for NetWare backs up each client in sequence, which resulted in a slower timing.

How We Tested

Our test network had two NetWare 4.1 servers and two DOS/Windows clients. Each server was a Compaq Systempro XL with 32MB of RAM and a 1GB hard disk. The clients were an HP Vectra XU 5/90C with 16MB of RAM and a 540MB hard disk,



and a Compaq Deskpro 486/33 with 28MB of RAM and a 320MB hard disk. We attached a single HP SureStore 6000 DAT drive to one of the NetWare servers. There were three other clients on our test-bed, which were not used in performance testing: another DOS/Windows PC, used for administration, as well as a Macintosh and an OS/2 Warp system, used to verify proper file restoration.

On the **Single-Server Backup** test, we performed a full backup of one NetWare server, including the NDS. The server contained about 915MB of data, constituting a mix of database, graphics, text, and application files. We also left two text files in use on one of the clients to see how each package would deal with open files.

On the **Multiple-System Backup** test, we backed up both NetWare servers and both DOS/Windows clients in a single job. The total combined data set for the four machines was about 2.4GB. We also ran Selective Restore and Full Restore tests (results not shown), which yielded no significant time differences.

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Palindrome in the Works

New products from Palindrome Corp. (800-288-4912) should be shipping as you read this. The company was hard at work on two major upgrades during the time we were preparing this article.

Backup Director, our previous Editors' Choice, (see "Performing Backup Magic," March 29, 1994), is being upgraded to Version 4.0, which delivers interface and features enhancements to Version 3.1. Network Archivist, now renamed Storage Director, Version 4.0, adds integrated hierarchical storage management (HSM) capabilities to all the features of Backup Director.

We took a peek at the prerelease Backup Director and liked what we saw. Its NetWare 3.12 installation was a breeze, and it works with native NDS in NetWare 4.1. Version 4.0 comprises several "managers" that handle different kinds of backup duties. The managers are tied together

under a slick new Windows interface. We always liked the DOS interface, but the port to Windows is a plus.

Backup Director supports both the Tower of Hanoi and GFS schemes, and it automatically tracks all the tapes in your tape sets. It even prompts you when to rotate sets off-site. Backup Director also sends notifications to SNMP-based management consoles.

Palindrome provides extensive support for Novell's Storage Management Services (SMS) and Standard Interchange Data Format (SIDF), used for writing tapes. Products from other vendors that adhere to SIDF should be able to read Palindrome tapes and vice versa.

Storage Manager adds capabilities such as file migration and automated archiving of your data. If you're planning a move toward HSM, you should definitely look at Palindrome's new Storage Manager.—JG

any given file that are stored on tape; simple utilities help you recover the database catalog. Unlike Legato NetWorker for NetWare and NEB, though, ARCserve

isn't designed to let users recover their own files: Anyone who recovers files gets full access to all the data on the tape.

In our testing, ARCserve took almost

twice as long as NEB in the Multiple-System Backup test. ARCserve backs up each system sequentially, while the other reviewed packages save time by streaming multiple

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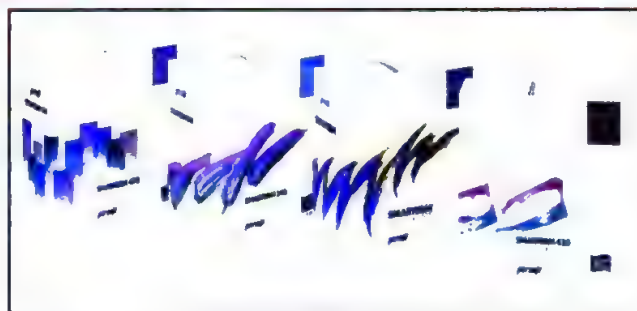


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sessions onto a single tape. If you have multiple tape drives, ARCserve can stream multiple sessions to your different drives.

We went through disaster recovery without a hitch. As with NetWorker, no utilities are provided for this task, but we found the documentation clear in guiding us through all the required steps.

It would be nice if ARCserve had a user-based restore, and performance could be better. But for basic backup and restore functions, we think Cheyenne Corp.'s package does a good job.

ARCserve for NetWare—Windows Edition, Version 5.01. List price: \$395 (5-user NetWare license) to \$9,295 (1,000-user NetWare license). Cheyenne Software Inc., Roslyn Heights, NY; 800-243-9462; fax, 516-484-3446; CompuServe, GO CHEYENNE. Circle 951 on reader service card

Legato Systems Inc.

Legato NetWorker 3.1 for NetWare



If you like a lot of flexibility in automating your backup, take a long look at Legato NetWorker 3.1 for NetWare. Be prepared, though, to spend some time figuring things out. The first time around—and compared with ARCserve and NEB—NetWorker's operation makes scheduling backup jobs seem complicated. But once we got used to NetWorker's way of doing things, we appreciated its flexibility.

The NetWorker installation process was straightforward. We loaded the main

software directly from the NetWare console; then we loaded graphical client software on an attached Windows client. The Windows software is optional: You can do everything directly from NetWare. We tested the Windows front end primarily. You can back up DOS, OS/2, and Windows clients at no extra cost; Windows NT and Unix agents are available separately.

For each tape server, you maintain separate client, group, and schedule lists. You add clients to groups and attach backup schedules to them. NetWorker does the best job here of letting you schedule tape-rotation schemes. You bring up monthly calendars that let you pick exactly the kind of backup you want each night.

On the downside, the Windows administration program doesn't have a file browser. So if you want more granularity in tagging files for backup, you must either select pattern-based filters, or you must hard-code specific directories you want to exclude.

For client backup, NetWorker uses self-executing active agents that maneuver directory trees themselves rather than having the server do it. The first time we used the DOS agent, the program caused an out-of-memory error halfway through the test, forcing us to unload some TSRs and run the test again, this time successfully. NetWorker handles multiple client sessions simultane-



STRONG AND FLEXIBLE: NetWorker's calendars let you assign backup schedules easily.

ously, making it faster than ARCserve for NetWare but a bit slower than The Norton Enterprise Backup (NEB).

Like NEB, NetWorker lets users restore their own files. The user-friendly client program (which includes a file browser) lets nonadministrators restore files on their own hard disks.

We performed a disaster recovery with no problem. NetWorker has no recovery utilities, but the documentation does a good job of detailing the tricky issues.

NetWorker has more complex capabilities than other packages, but if you have a lot of servers and data to manage, its strong points will offset its inherent complexities. If you have just a few servers, you may be happier with ARCserve.

Legato NetWorker 3.1 for NetWare. List price: \$1,500 (100-user NetWare license) to \$8,000 (1,000-user NetWare license). Legato Systems Inc., Palo Alto, CA; 415-812-6000; fax, 415-812-6032; e-mail, sales@legato.com, Web, <http://www.legato.com>. Circle 952 on reader service card

SUITABILITY TO TASK

Legato NetWorker for NetWare

Scripting and automation	Good
Enterprise backup	Good
Selective restore	Good
Disaster recovery	Good

DAT's Not All, Folks

Backup medium	Description	Media capacity	Drive cost	Cost per 100MB	Advantages	Disadvantages
CD-R	Compact disk—recordable; CD technology that uses a laser to read and write to CD-ROMs.	650MB	\$3,000 to \$8,000	\$2.00	Extended lifetime; can read data directly from backup media.	High drive cost; cannot be overwritten; low capacity.
DAT	Digital audio tape, 4-mm digital-magnetic-tape technology that uses the helical-scan recording method.	2GB to 4GB	\$800 to \$1,700	\$1.00	High capacity, fast, low drive and media costs	Has neither the speed nor the capacity of 8-mm tape or DLT
DLT	Digital linear tape; digital-cartridge-tape technology that simultaneously records and reads multiple channels.	6GB to 40GB	\$3,100 to \$25,000	\$0.80	High capacity, fast; very low media cost.	High drive cost.
8-mm helical-scan	8-mm digital-magnetic-tape technology that uses the helical-scan recording method.	2.5GB to 7GB	\$1,400 to \$2,500	\$0.20	High capacity, fast, very low media cost	High drive cost.
Magneto-optical	Disk technology that uses a combined laser and magnetic method to write and a magnetic method to read.	200MB to 250MB	\$850 to \$1,200	\$17.00	Does not require extra software, low drive cost; can read data directly from backup media.	High media cost; low capacity.
QIC (full-size)	Quarter-inch cartridge; magnetic-tape technology that uses the serpentine recording method.	60MB to 5GB	\$1,200 to \$3,500	\$2.00	High capacity; low media cost	High cost

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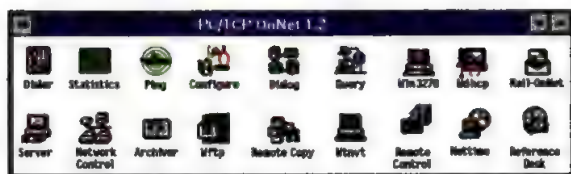
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CIRCLE 861 ON READER SERVICE CARD

NetWare 4.1 Backup

Moving from NetWare 3.x to 4.1 can be tricky territory for your backup plan. Keep these things in mind:

Your backup package should be SMS-compliant. It must use Novell-provided Target Service Agent (TSAs) to let you back up NDS information in 4.1 servers.

You'll probably also need Bindery emulation services, which make your NetWare 4.x server look like a 3.x

server to apps. (We'd like to see standard NDS-style logins for backup procedures.)

Finally, 4.1's High Capacity Storage System and file-compression services can be trouble. You don't want your backup software automatically decompressing or files migrating back to the hard disk every time you run backups. If you use these services, make sure your backup software can handle your files appropriately.—JG

Symantec Corp.

The Norton Enterprise Backup

A newcomer to the scene, The Norton Enterprise Backup (NEB), is geared for large shops. If you're thinking big, then NEB's domain-based architecture and fast performance could be for you.

Like other Symantec Corp. products, NEB is easy to install. Even so, we had to login to our NetWare 4.1 servers using Bindery emulation. During installation you create an NEB domain, where all your NetWare-based backups will occur. You choose one *main* server, where the main NEB files are stored and select any number of tape servers, where you attach your tape drives.

NEB does a lot of the work for you. You select the systems for backup, but NEB can pick the best tape drive for each backup job, optimizing for distributed loads. If one tape drive goes down, NEB can reroute the backup to another device. Like Legato NetWorker for NetWare, NEB can interleave multiple client streams to a single tape,

which helps explain its first-rate performance on our Multiple-System Backup test.

To aid in disaster recovery, NEB schedules a separate job to store the database information for all backups in your domain.

This job must exist on a separate tape. Though this could be a pain for smaller shops, we recommend it. Otherwise, you'll have trouble recreating your domain structure.

The clear NEB user interface reminds us

included, and a Macintosh agent should be available by the time you read this.

It was also easy to restore files, but we would prefer more granularity of information. For example, we couldn't view all available versions of a given file, and we couldn't scan our file list by tape or tape session. On the other hand, NEB does include a clearly presented File Manager-like browser, and you can let users restore their own files.

We'd also like more detailed error messages. One time when we loaded agents on the client, they didn't appear on the server. The fix was easy, but the client reported that everything was okay, leaving us wondering. The error log was also sparse: It didn't even report the size of its backups.

Overall, NEB may be most appealing to larger NetWare shops.

The Norton Enterprise Backup. List price: \$1,095 (1-server license) to \$75,995 (100-server license); \$66 per node (5 client licenses) to \$44 per node (1,000 client licenses). Symantec Corp., Cupertino, CA; 800-441-7234; fax, 408-253-3968; Web, <http://www.sym.com>.

Circle 953 on reader service card

SUMMARY OF FEATURES

Network Backup

■ YES ■ NO

Products listed in alphabetical order

ARCserve for
NetWare—
Windows
Edition 5.01

PC MAGAZINE
NETWORK EDITION
EDITORS' CHOICE

Legato
NetWorker 3.1
for NetWare

The Norton
Enterprise
Backup

	ARCserve for NetWare— Windows Edition 5.01	Legato NetWorker 3.1 for NetWare	The Norton Enterprise Backup
List price	\$395-\$9,295	\$1,500-\$8,000	\$1,095-\$75,995
Fully backs up NetWare 3.12 and 4.1 servers	■	■	■
Loads NLMs on server	■	■	■
Tape drive attaches to server	■	■	■
Supports Novell SMS	■	■	■
Administration program platform	Windows	DOS, Windows, NetWare, OS/2	Windows
Client Backup			
DOS	■	■	■
Microsoft Windows	■	■	■
OS/2	Optional	■	■
Macintosh	Optional	■	■
Backup			
Attended and unattended backups	■	■	■
Retries open files	■	■	■
Tape-rotation scheme	GFS, custom	Custom	GFS, Tower of Hanoi, custom
Interleaves multiple clients on one tape	■	■	■
Can use multiple tape drives simultaneously	■	■	■
Auto-changer support	Optional	■	■
Restore			
Keeps integrated file list from all tapes	■	■	■
Displays all versions of a file	■	■	■
Users can restore their own files	■	■	■
Can redirect restored files	■	■	■

1 All users have full access to data on backup tape

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First Looks

HANDS-ON REVIEWS OF NEW SHIPPING PRODUCTS

NETWORK MANAGEMENT

An Affordable Network Watchdog

By Greg Alwang

While many network management tools can put a major dent in your software budget, Caravelle Networks Corp.'s Caravelle Watcher, Version 2.0, breaks the mold. For only \$129 (for ten devices), Watcher provides entry-level fault management for your network from a single, central PC. Don't look for high-end SNMP management, software distribution, or other sophisticated features, though. Watcher is strictly a tool for tracking the status of your network devices.

In fact, Watcher is the picture of simplicity when it comes to network management. A limited version of the program is even available for download from Caravelle's BBS (613-225-1383). No direct competitors to Watcher spring to mind, but products like Avanti NodeInfo are in the same general category (see Network Edition, First Looks, June 28, 1994).

Watcher installs easily on any Windows 3.x client connected to a NetWare or TCP/IP network. Like the feature set and price, Watcher's hardware requirements are rather modest: 4MB of RAM and 3MB of disk space. Unlike other network monitoring software, Watcher does not require any NLMs. It also doesn't consume gobs of network resources. Watcher simply sits in the background and quietly queries each network device, reporting the status back to the Watcher console.

The product includes two tightly integrated modules: a monitoring module and a noti-

fication module. The monitoring module tells you whether devices are up (currently connected to the network) or down. The notification module sends prespecified messages

for each device, so that you will know about it if the device goes down. Watcher will notify you via on-screen messages or by dialing an alphanumeric pager. Notifications can be sent immediately, or delayed from 5 minutes to one week of downtime. If a device returns to its normal state before the delay is over, the notification is not sent and

you won't receive a false alarm.

For each device, Watcher can track test results, notifications, IPX or IP address information, key-device information, and any notes that you add about the device. Key devices are those upon which other devices are dependent. A print queue, for example, is dependent on a given printer or print server, so the latter devices would be key devices.

Watcher does not include a reporting utility, but you can export all of the device information in tab- or comma-delimited ASCII format for use with most word processor, spreadsheet, or database programs.

Caravelle Watcher, Version 2.0. List price: 10 devices, \$129; 25-device upgrade, \$179; 50-device upgrade, \$249. Caravelle Networks Corp., Nepean, Ontario, Canada. 613-225-1172; fax, 613-225-4777.

Circle 957 on reader service card



RED ALERT: Watcher will notify you if a network device goes down and will suggest the most likely reason for the crash.

when a device goes down or comes back up.

PICK AND CHOOSE

You select devices to monitor from a list of categories, such as file servers, clients, and even print queues. Once devices are selected, they are displayed on the monitor screen with current status information ("down", "on hold", "up", or "not tested") and the current condition (such as the number of print jobs for print queues or disconnect status for devices that are down).

Watcher tests each device in a series of passes, which take place at user-defined intervals ranging from once a minute to once a day. When a device goes down, Watcher returns an error condition such as "Packet was not returned" for clients or "Possible cable disconnect" for servers.

You can define notifications

REMOTE ACCESS

Small Box, Big Features

By Steve Rigney

Shiva's new NetModem/E 28.8 Release 3.5 (\$1,995), supports only a single connection, but it offers more remote-access features than many of the more expensive multiport solutions we've seen. The NetModem/E is intended for small businesses with limited remote-access needs. With a wide array of features and simple installation, the easy-to-use NetModem/E is an excellent solution for its target market.

The NetModem/E is about the size of a desktop modem and includes a V.34 (28.8 Kbps) modem and Ethernet connections for both 10Base-T and

coaxial cable. The NetModem/E also includes the same Release 3.5 of the Shiva software that comes with the higher-end LANRover (see the sidebar, "The LANRover Learns a Few New Tricks").

Release 3.5 of the Shiva software includes new features such as dial-out faxing and modem sharing, a client for Microsoft Windows 95, enhanced TCP/IP support, and new security and management tools.

The first thing you'll note about the NetModem/E is how easy it is to install. Even a novice user should be able to set up the NetModem/E within minutes of unpacking the product. The Shiva Net Manager

NETWORK EDITION

First Looks

utility (SNM) runs on either a Macintosh or a Windows PC and allows you to set up and configure multiple NetModem/Es or LANRovers from a central location.

Unlike other remote-node vendors, such as Microcom, Shiva does not charge extra for remote-node client software. Instead, you receive an unlimited user license of Shiva Connect with every NetModem or LANRover you purchase. Shiva Connect works with PCs running DOS, Windows, and Windows 95, as well as Macintoshes. Shiva Connect supports several different network protocols, including AppleTalk, IPX, NetBEUI, TCP/IP, and LLC 802.2.

One of Shiva Connect's key new features is its ability to use NetWare's VLM client drivers

to connect to a remote server.

Unlike the older NETX drivers, the VLM (Virtual Loadable Module) drivers allow you to connect and disconnect remote-node links without exiting Windows and rebooting your PC. Other remote-access servers, including the Microcom LANExpress, also support the VLM drivers.

The NetModem/E is currently the only single-port remote-node server that offers network fax capabilities. Unfortunately, you can send faxes but not receive them, and the NetModem/E currently works only with Delrina's WinFax Pro networking software.

You can use the NetModem/E to dial-out across the



LITTLE BIG MODEM: The NetModem/E now offers 28.8-Kbps performance.

network from any Macintosh or DOS or Windows PC using Shiva's comm-port redirection utility. To dial out using a DOS-based comm package, you will have to use INT14 or NASI to redirect your comm port to the NetModem/E.

In addition to dial-in and dial-out, you can also use two NetModem/Es to route AppleTalk, IP, and IPX packets between remote networks via a dial-up connection. The LAN Connect software is easy to use

and allows you to establish a LAN-to-LAN connection with a click of the mouse.

The NetModem/E offers several security options including NetWare Bindery support, user names and passwords, dial-back, and the ability to use third-party security packages. The NetModem/E also works with the Terminal Access Controller Access Systems (TACAS) security standard.

The NetModem/E comes with an SNMP agent that provides the network manager with hundreds of different statistics when used with any SNMP management console. **NetModem/E 28.8 Release 3.5.** List price: \$1,995. Shiva Corp., Burlington, MA; 617-270-8300; fax 617-270-8599.

Circle 954 on reader service card

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NETWORK EDITION

First Looks

The LANRover Learns a Few New Tricks

The NetModem/E isn't the only Shiva product sporting new features. The LANRover, a multiport remote-access server, also boasts some key improvements. With each review of the LANRover, Shiva's flagship product, we've been impressed—this time is no exception.

Like the NetModem/E 28.8 3.5 (reviewed above), the LANRover/E Plus Release 3.5 also now includes the latest Shiva software and V.34 28.8-Kbps modems. The difference is that the LANRover can support four or eight modems, not just one. Since these modems are built-in, installation of the LANRover is very simple. Also, you can configure the LANRover to work with third-party external modems. You can even mix and match internal and external modems on the LANRover.

If 28.8 Kbps just isn't fast enough for you, the LANRover is available with high-speed asynchronous ports for use with ISDN, X.25, and other types of high-speed links for connecting to your host network. This gives the LANRover a key advantage over its nearest competitor, Microcom's LANexpress, which supports only standard modem connections. And the LANexpress doesn't offer Macintosh client support,

while the LANRover (like the NetModem/E) includes client software for both PCs and Macs.

In terms of price, the LANRover lists for between \$4,899 for a four-port model with high-speed serial ports to \$8,899 for an eight-port model with built-in V.34 modems. The LANexpress 2.0, on the other hand, is priced lower at \$7,999 for an eight-port model with built-in V.34 modems. But Microcom charges an extra \$50 per node for client software, while Shiva includes software free with the hardware.

The LANRover comes in a slim, 19-inch chassis that you can stack or rack-mount. The LANexpress does not easily mount in most 19-inch racks.

If you like the features in the NetModem/E, but you need more ports, the Shiva LANRover may be the product for you. It has all the bells and whistles you could ask for and compares well with its competition.

LANRover/E Plus Release 3.5. List price: Ethernet version, \$4,899 to \$8,899 (depending on configuration). Shiva Corp., Burlington, MA; 617-270-8300; fax, 617-270-8599.

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First Looks

FAST ETHERNET

King of the Hill?

By Charles Lin

There's another new challenger in the Fast Ethernet arena. Standard Microsystems Corp.'s new EtherPower 10/100 adapters, the PCI version in particular, shine in terms of both price and performance, and the cards should give the competition fits in this rapidly expanding market.

The SMC EtherPower PCI (\$259) is an excellent choice for upgrading your clients to 100Base-TX Fast Ethernet. The EISA version (\$299) is a little rough around the edges but shows a lot of promise.

At under \$300 each, these adapters should definitely be considered before you shell out any money for a 10-Mbps Ethernet adapter.

A TALE OF TWO BUSES

The PCI version's numbers were impressive, as the card edged out the Intel PRO/100 PCI (\$259) on our NIC Throughput tests. The EtherPower PCI peaked at nearly 80 Mbps and turned in respectable CPU Utilization numbers. Still, the PRO/100 was far more efficient and remains the best choice among PCI 100Base-TX server cards.

The EtherPower EISA performed poorly on our CPU Utilization tests and was not as speedy as its PCI brethren (it peaked at roughly 60 Mbps). It certainly, however, ranks among the fastest and most affordable EISA Fast Ethernet adapters currently available.

In addition to performance and efficiency, the EtherPower PCI differs from the EISA version in two important ways: It supports full duplex (via Digital

Equipment Corp.'s Fast Ethernet chip set) and bus mastering. Full duplex can provide a critical boost to server-to-switch connections, while a glance at the EISA version's CPU Utilization scores shows how important bus mastering can be. Like 3Com, SMC guarantees the EtherPower PCI to work in any PCI slot, regardless of whether or not the slot supports bus mastering.

If you have a fear of installing peripherals, you'll be glad to hear that both versions of the EtherPower 10/100 have the most user-friendly installation processes we've seen.

GAINING MOMENTUM

It's becoming increasingly obvious that many vendors view Fast Ethernet as the future of Ethernet networks. At the time of this writing, the 100Base-TX (IEEE 802.3u) specification was in its final stage of approval

by the IEEE, and dozens of 100Base-TX products were poised to ship within the next few months.

The EtherPower 10/100 adapters take full advantage of the 100Base-TX specification by each offering an auto-sensing RJ-45 port for UTP cabling, plus a DB-9 connector for STP cabling. Other than the very early versions of Grand Junction's FastSwitch 10/100 (which did not support 100Base-TX), these are the only STP Fast Ethernet products we've seen to date. That being the case, however, networks with STP cabling will have no viable upgrade path to 100Base-TX until STP repeaters hit the market.

SMC EtherPower 10/100. List price: PCI version, \$259; EISA version, \$299. Standard Microsystems Corp., Hauppauge, NY. 800-762-4968.

Circle 956 on reader service card

BENCHMARK TESTS

Fast Ethernet Adapters

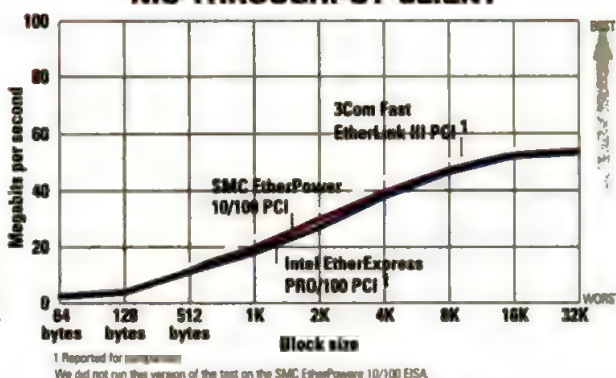


During our client and server performance test runs (using the NIC Throughput test from NetBench 3.0), the SMC EtherPower 10/100 PCI, the Intel EtherExpress PRO/100 PCI, and the 3Com Fast EtherLink III PCI were very evenly matched. The SMC EtherPower 10/100 EISA

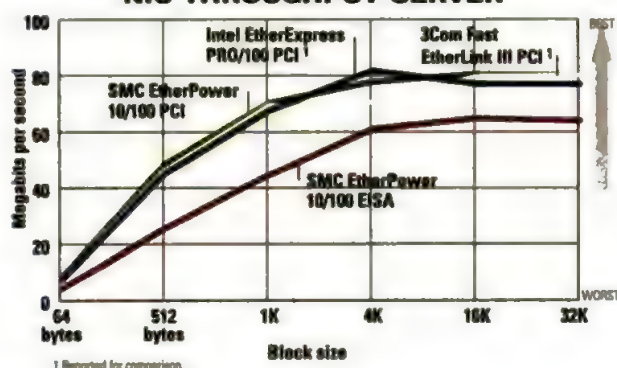
trailed the PCI cards on the server version of the test, peaking at about 60 Mbps.

On the CPU Utilization test, conducted using Novell's STAT.NLM, the PRO/100 was by far the most efficient server card. Although the EtherPower PCI turned in respectable numbers here, the EtherPower EISA performed miserably—at or near 100 percent across the board.

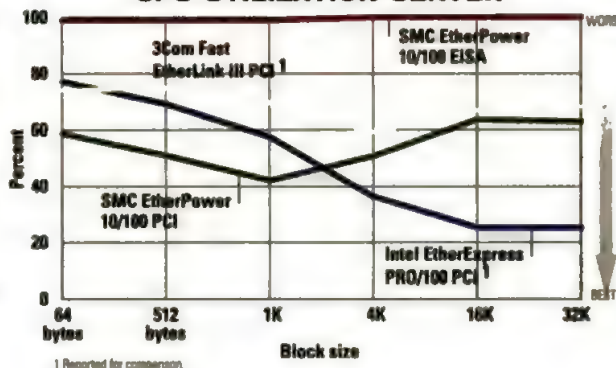
NIC THROUGHPUT CLIENT



NIC THROUGHPUT SERVER



CPU UTILIZATION SERVER



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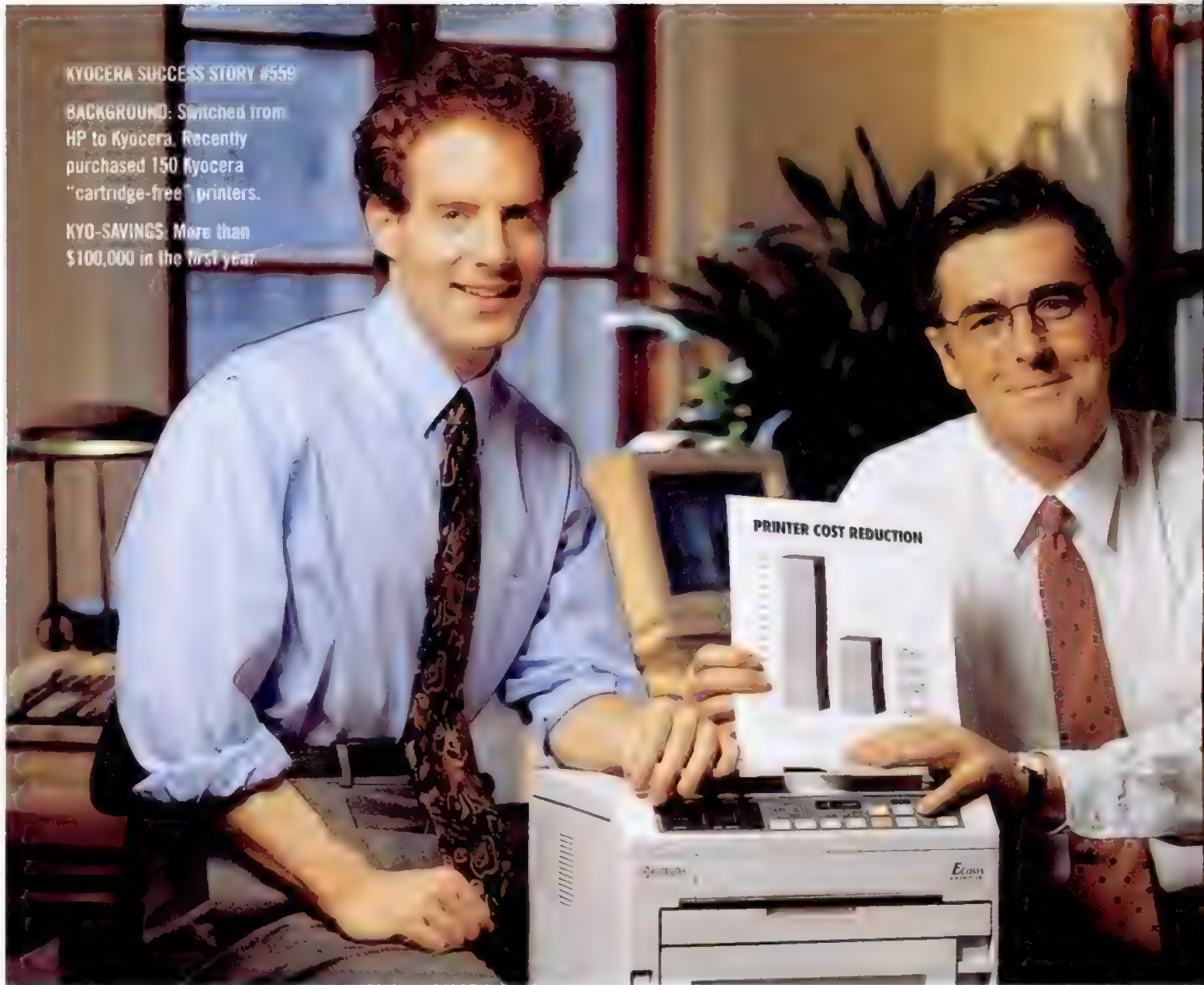
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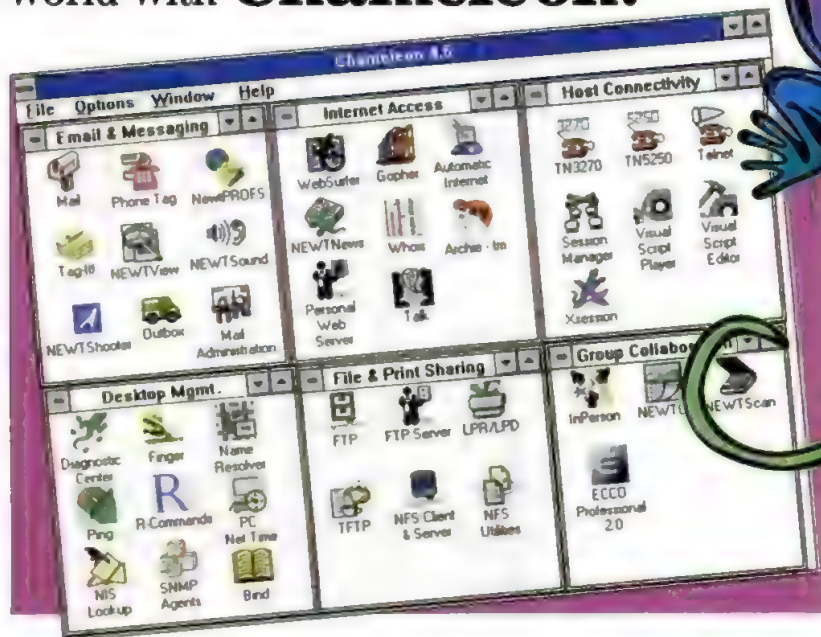
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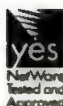
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CIRCLE 877 ON READER SERVICE CARD

NETWORK EDITION

First Looks

REMOTE ACCESS

Modem-Sharing Made Easy

By Padraic Boyle

Modem Assist PLUS, Version 4.0 (two-port server, \$299; unlimited-port server, \$999), from Synergy Solutions, provides a quick, easy, and affordable solution for sharing modems across your network. If you already have an "extra" PC and some modems, you can build your own modem pool with Modem Assist PLUS for less money than you'd pay for a turnkey solution like the Shiva LANRover (see the review in this issue).

Modem Assist PLUS comprises two components: the Modem Server and the Client Redirector. The Modem Server software can be installed on any

client running the IPX/SPX, NetBEUI, or NetBIOS protocol and can operate in either dedicated or nondedicated mode. You can connect up to 16 modems to the Modem Server system. The software is sold in packages that support two ports on a single Modem Server and unlimited ports on multiple servers.

On the client side, Modem Assist PLUS supports DOS and Windows PCs. A DOS machine must run a TSR version of the Client Redirector; the Windows version is a DLL. As the name suggests, the Client Redirector takes data bound for a PC's comm port and redirects it to the Modem Server PC.

Even though the product includes separate client software for DOS and Windows, the installation utility handles them both. Most other packages require you to run one installation utility for Windows and another for DOS. Modem Assist PLUS's installation routine recognizes the environment you're using and adapts automatically.

We do have one complaint about the installation process: While configuring the Windows client for redirection to comm port four, we had to dig deeply into the documentation to find the correct settings. The answer was in there, but it would have been nice if that information had been included in the installation software.

Once installed, Modem Assist PLUS provides reliable dial-in, dial-out, and fax capabilities. In the event that all of the modems

on the Modem Server are in use, Modem Assist PLUS can queue additional connection requests.

Since Modem Assist PLUS comes only with a generic, ASCII-based terminal package, you'll want to supply your own comm software to dial through the Modem Server. Fortunately, Modem Assist PLUS works with most comm packages that support the Interrupt 14 (INT 14), NASI, or Windows communications interface. One other positive note: The Windows redirector does not replace the Windows COMM.DRV communications driver (as is the case with many other products).

Modem Assist PLUS, Version 4.0. List price: two-port server, \$299; unlimited-port server, \$999. Synergy Solutions, Mesa, AZ. 602-545-9797; fax, 602-545-9827; CompuServe, GO SYNERGY. Circle 955 on reader service card

MULTIPLE ACCESS By Steve Buehler

What ISDN Needs



Remember "critical mass"? That's the term for the point in a nuclear chain reaction where the process becomes self-sustaining. You can't have an effective thermonuclear explosion without it (and nuclear power is good sometimes.)

ISDN has been amassing more support. It's available in more states, Cisco and 3Com (among others) have added ISDN to products, and it's in SOHO and Internet-access products like Chameleon. But what it doesn't have yet is critical mass. It needs three more things.

First and most important is good installation and diagnostics. Many of us at PC Magazine Labs have found that ISDN products aren't ready for prime time. Oh, they "work"—the products do what the vendor claims. But if things don't "just work," it's a painful process.

Part of this problem is provisioning—that is, setting up line parameters—and working with other products. All telcos know "Intel Blue" or "Internet 64" as a shorthand for some parameters. Most ISDN products know these, but some use terminal type (A, B, C, D) definitions for provisioning.

This damper on the explosion will get worse as more devices using different provisioning compete for the line. I set up AT&T's Vistium, the ISDN*tek Internet Access Card, and the Combinet Everyware 160 remote LAN bridge on my home-office ISDN line.

After much effort and 12 calls to tech support, I discovered the ISDN*tek card wanted to be the *only* device on my ISDN line.

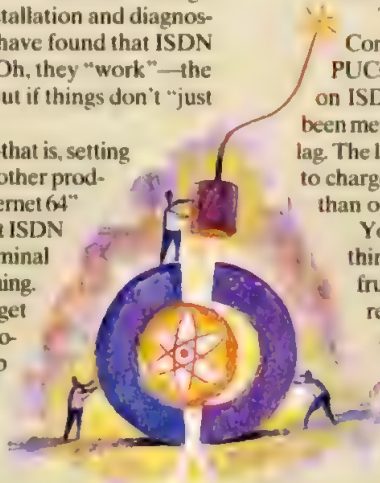
The fix? Every ISDN vendor should include a description of its provisioning parameters, diagnostics to assess whether they're correct, and compatibility charts to let the buyer know what works with what. Either that, or pick one standard set and have everyone work with it.

The second key is standards-based compression. Many vendors use proprietary compression, but right now most telco switches will only let you run at 56 Kbps per channel. Using heterogeneous single-channel ISDN terminal adapters, that's slower than 28.8-Kbps modems with standards-based compression. Few prudent network managers will approve single-source vendors for ISDN hardware when \$200 modems and analog phone

lines are both as fast and easier to set up and provision.

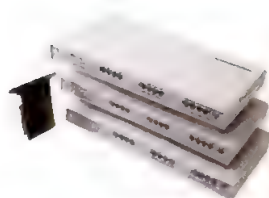
The third key rests with the state Public Utilities Commissions (PUCs), which regulate ISDN. Several PUCs understand the importance of intelligent tariffs on ISDN service. South Dakota and Tennessee have been mentioned as leaders, while Connecticut continues to lag. The latest surprise here is California—these folks plan to charge basic rate (2B+D) users for three lines rather than one. Their plan raises rates by some 30 percent!

You probably can't do much about the second and third problems. But to avoid installation and setup frustration, take the time to work out provisioning requirements and capabilities between your telco and your ISDN vendor ahead of time. It'll be tedious, but this is the only way to prevent blowing up over the inevitable connection problems. It'll also give you a chance to see which vendors will be helpful down the road when other support may be needed. □





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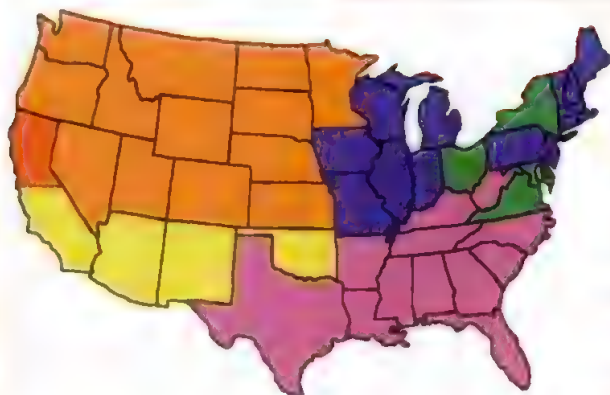
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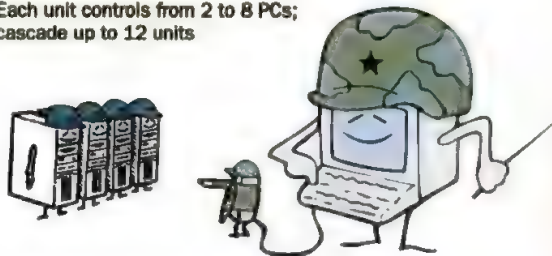
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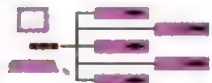
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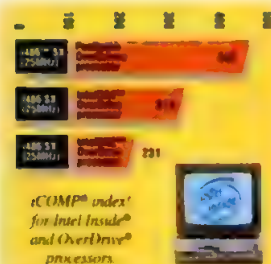


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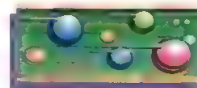
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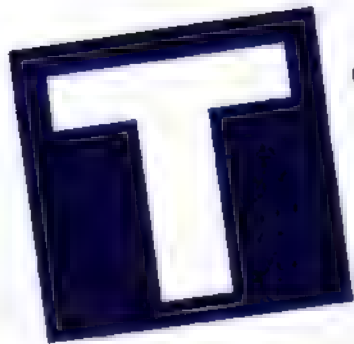
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Today, small offices of every sort run surprisingly large and sophisticated operations. Technology often plays an even bigger role in those offices than in vastly larger companies—and that technology is often the key to their success in competing with those larger firms.

The small-office/home-office market for computer hardware and software is booming. Link Resources, a market-research firm located in New York City, predicts that nearly 60 million Americans will be working at home by 1998, up from 37 million in 1994. And according to Link Resources the number of small businesses with ten employees or less has grown by nearly 10 percent from 1992 to 1995 (projected), from roughly 6.4 million to roughly 7.0 million. But the definition of "small office" goes far beyond just home offices and small businesses; *PC Magazine's* taxonomy includes branch offices, telecommuting centers or "satellite offices," and the virtual "mobile office."

The growth of these nontraditional offices reflects powerful trends. One is the imperative to decentralize, to divide and distribute the parts of a business down to the smallest effective units. Another is the push for reduced costs, achieved by reducing the size of the workspace provided for each employee. A third is public pressure from new governmental regulation—particularly the 1990 Clean Air Act, which requires that by 1996, employers with more than 100 employees in any of ten metropolitan areas reduce by 25 percent the number of vehicle miles their work-

Converging trends in PC technology, communications, and lifestyles have created a small-office/home-office explosion. Here's how to equip a small office with the hardware and software you need to compete with the big boys.

By Jim Seymour

SMALL-OFFICE POWER





Home Office

- 1 **PENTIUM-CLASS PC** with 8MB to 16MB of RAM, 540MB to 1GB hard disk, Super VGA display, quad-speed CD-ROM drive, and 16-bit sound card.
- 2 **15- OR 17-INCH COLOR SUPER VGA MONITOR.**
- 3 **QIC-COMPATIBLE TAPE DRIVE** to back up your precious data. Fits entire hard disk on one tape cartridge.
- 4 **POWERED SPEAKERS.**
- 5 **DESK WITH KEYBOARD SHELF** or drawer at a height of 26 inches.
- 6 **UNINTERRUPTIBLE POWER SUPPLY** (250 to 400 volt-amperes) to protect data from brownouts and power interruptions.
- 7 **TWO- OR THREE-LINE PHONE** with LCD screen.
- 8 **DIGITAL/ANALOG TELEPHONE SWITCH** to route a limited number of incoming phone lines to multiple extensions.
- 9 **DESKTOP VIDEOCONFERENCING SYSTEM** (over ISDN) to let telecommuters stay in visible contact with the main office.
- 10 **VOICE MODEM** with voice mail software.
- 11 **MULTIFUNCTION PRINTER** to provide printing, faxing, and convenience copying in one space-saving unit.
- 12 **ERGONOMIC CHAIR.**

Illustrations by Marty Braun



Small Office

- 1 PENTIUM OR 486 SERVER** with 32MB to 64MB of RAM and 2GB hard disk running a small-business LAN OS, and doubling as receptionist's workstation.
- 2 DAT- OR QIC-COMPATIBLE TAPE DRIVE** to back up data stored on the server.
- 3 UNINTERRUPTIBLE POWER SUPPLY** (400 to 600 volt-amperes) to protect data from power outages and brownouts.
- 4 DIGITAL/ANALOG PHONE SWITCH** to route a limited number of incoming lines to multiple extensions.
- 5 PENTIUM- AND 486-CLASS PCs** with 15- or 17-inch color Super VGA monitors.
- 6 NETWORK INTERFACE CARD.**
- 7 UNSHIELDED TWISTED-PAIR CABLING** running from each PC to the hub in a star configuration.
- 8 10BASE-T ETHERNET HUB.**
- 9 DESKTOP COPIER.**
- 10 WORKGROUP LASER PRINTER.**
- 11 PLAIN-PAPER FAX MACHINE.**

ers travel to work. A fourth is corporate downsizing, which has forced many people to find ways to make money on their own. Finally there's our growing sense of individualism, a wish by many workers to be more in control of their lives.

The enabling technologies facilitating these changes are, of course, computers and communications. Both are only now coming together in terms of power and affordability. The rapid spread of ISDN lines, and the promise of faster-still ATM (asynchronous transfer mode) links to come, make high-speed connections easy and affordable.

Ten years ago these changes in how America does business would have been literally impossible. Ten years from today, the transition may be well-nigh complete. Indeed, working in an alternative office today hardly means giving up competitive advantage, but rather, gaining advantages over those who are still working within the traditional desk-bound model.

WHERE DO YOU FIT?

The needs of each of the alternative offices we've defined vary, so before we discuss what to buy let's first set out our view of these new structures.

Home office. This is the lair of anyone who does serious work at home. That may include occasional after-hours and weekend work for those who work 9:00 to 5:00 in conventional offices, but use a home office as a "workday stretcher." The home office is often also the only office of the entrepreneur, telecommuter, or freelancer. Without staff members, the role of computers and their associated equipment becomes critical.

Small-business office. With from 3 to 12 workers, the business may be small, but it almost always competes with larger entities. Smart technology investments help keep that competition on a level playing field.

Branch office. An outpost of a larger enterprise, the branch office uses systems



Panasonic's telephone switch, the \$769 DBS824.

similar to those in the main office. Connectivity is vital, both internally and in links to that main office—and likely to other branch offices.

Telecommuting center or satellite office. Scale isn't what makes this an alternative office—it may be very large, indeed—but rather, its approach to employees' workspaces. The center includes desk space, computers, and other office equipment, and offers connectivity both to on-site LAN servers and to main-office systems some distance away. Workers come because it is nearer to their homes and, possibly, their clients' offices; their schedules are irregular; and their needs vary greatly. Some workers may be part-time or temporary. The facility itself may be owned and managed by their employer, or it may serve employees of several companies. Communication and connectivity demands are extensive.

Mobile office. A notebook PC and a cellular phone form the basis of a powerful portable office. Add a tiny printer and software for e-mail, faxing, and dial-in access to your employer's central LANs, and you've got a very capable system. For salespeople and others on the road more than in their office, this setup epitomizes that notion of competitive advantage.

THE HOME OFFICE

Even the most minimal home offices need at least two phone lines: one for business calls, one for personal and family calls. If you'll be using a fax machine or PC fax card very much, you probably also want a dedicated fax line. And if you plan to use your computer on-line very often, you

may well want a fourth line, strictly for data use.

Today's low-cost multiline telephone switches (so-called mini-PBXs) can be great investments for the home office. These briefcase-size units sell for as low as \$300 and let you share limited incoming lines among many extensions. They're loaded with programming features. For example, you can program them to route business calls to your kitchen phone if no one picks up in your office during certain hours, and

to voice mail at other times. You can also transfer calls internally and ring other phones in your house using an internal intercom system. Tip: consider a combination digital/analog system. Such conveniences as cordless phones are rare in all-digital systems. If you don't want to spend the money required to maintain several phone lines, there are two alternatives: First is a new group of modems that incorporates VoiceView technology from Radish Communications Systems (800-723-4748, 303-443-2237). VoiceView lets you speak and send files on one line in one call; be aware that the jury is still out on its effectiveness. VoiceView is already supported in modem products from Cirrus Logic, Diamond Multimedia Systems, GVC Technologies, Hayes Microcomputer Products, and Zyxel, and should be included in several other products by the end of 1995.

Another alternative is an adaptive answer-capable modem, which can distinguish between incoming data and fax calls. Any Class 1 fax modem based on the Rockwell chip set that has shipped since 1990 supports adaptive answer, as do some combination fax/communications packages, such as DataStorm Technologies' Procomm Plus 2.0 for Windows (\$179).

Distinctive ring, a service that is offered by phone companies throughout the U.S., allows you to have up to four different phone numbers assigned to one line, each with its own ring pattern. A ring-

aware modem can be configured to answer calls that come in on only one of the four ring patterns, letting you share one line among four different uses. Distinctive ring is offered in most metropolitan areas. Make sure you purchase a ring-aware modem and fax/data communications package. Modems based on AT&T and Rockwell chip sets include support for this feature as does Procomm Plus for Windows.

A PC-based voice mail system—probably on a multifunction voice modem/sound card—can make you seem a lot more businesslike to callers. Advanced remote call retrieval, message forwarding and storage, and other true voice mail features stack the deck even further against an answering machine. See "At the Sound of the Beep..." in this issue for a roundup of nine voice mail hardware and software packages.

If you plan to be connected to a remote LAN for significant periods of time, you should seriously consider basic-rate ISDN service. ISDN lines allow direct digital transmissions of 128 Kbps (two 56-Kbps channels and one 16-Kbps channel). Prices for ISDN vary depending on the telephone company in your region, but a typical ISDN installation costs \$130. Line charges usually run



Desktop videoconferencing keeps telecommuters visible.

about \$50 per month, and usage rates range from 2 cents to 5 cents per minute.

Remote workers connected to an office LAN over an ISDN line usually perceive the connection to be about as fast as if they were in the office and linked directly to the LAN.

ISDN also opens up the world of desktop videoconferencing. POTS videocon-

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Processor	486DX2/66	Pentium 75MHz	Pentium 75MHz
Processor Upgradable	Yes	Yes	Yes
Std./Max. Memory	8MB/136MB	8MB/192MB	16MB/192MB
Hard Drive	420MB	420MB	720MB
Cache Internal	8KB	16KB	16KB
Cache External	256KB (optional)	256KB	256KB
Local Bus Graphics	PCI	PCI	PCI
Video Memory/Max.	1MB/2MB	1MB/2MB	2MB/4MB
Compaq SVGA Color Monitor	Yes	Yes	Yes
Diskette Drive	3.5" 1.44MB	3.5" 1.44MB	3.5" 1.44MB
Expansion Slots (Total)	3	4	5
Drive Bays (Total)	3	4	5
Ports: Serial/Parallel	1/1 (ECP)	1/1 (ECP)	1/1 (ECP)
Security Features	Yes	Yes	Yes
101-Key Keyboard, Mouse	Yes	Yes	Yes
Software Preinstalled	MS-DOS® 6, MS-Windows® 3.1	MS-DOS 6, MS-Windows 3.1	MS-DOS 6, MS-Windows 3.1
Energy Star Compliant	Yes	Yes	Yes
Warranty*	3-Year	3-Year	3-Year

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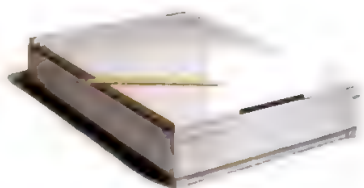


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ferencing solutions exist, but they trail way behind ISDN solutions when it comes to practical day-to-day use. Many ISDN-based desktop videoconferencing systems, including those from AT&T and PictureTel, offer compatibility with the widely used H.320 standard, which means that the telecommuter can call into the

main office's room-based or rollabout videoconferencing system during an important meeting. As useful as videoconferencing but far less expensive, document-conferencing software lets two or more users connected by ISDN, POTS, or LAN work on the same document in real time.

HOME-OFFICE PCs

Your home-office PC will likely be called on for a variety of tasks, including multimedia education and entertainment for your children, desktop publishing, and creating presentations. You'll need plenty of processing power and hard disk space to hold and run such a

Legal Issues for the Home Office

By Bill Howard

You wouldn't want your neighbor setting up a quick oil-change franchise in his driveway. Will he mind if you set up a home office? Probably not. One is highly visible and creates traffic; another is virtually invisible. But it pays to move cautiously. Here's what you need to know when you're setting up a home office.

You need to focus on three issues: zoning, insurance, and taxes.

ZONING

For all that has been written about home-office zoning woes, our experience is this: If you are working solo out of your house, it is unlikely you will have zoning problems. Either home offices are allowed, variances can be had, or no one's going to notice. Most solo white-collar home businesses are invisible to the outside world. If people come to your house to do business, if you have employees who work at your house, or if you advertise locally, someone's going to notice and possibly complain.

Most communities don't enforce zoning restrictions against most home businesses until someone complains. Our advice: Find out informally what the rules are in your town for your neighborhood, then decide among your options.

INSURANCE

Make sure you level with your insurance company even though business rates are higher than residential rates. You want to be covered in case of an accident or loss. If you get in an auto accident while using your car for business purposes and you're not paying business rates, the

insurance company might accuse you of "fraudulent representation" and pay off only your insurance minimums—not the full amount of your coverage.

See if you can get a supplemental liability umbrella policy. This covers you beyond the basic insurance you have for your home and car. \$1 million in coverage costs \$100 to \$150 a year and in some cases you can cut back on your auto liability insurance. In other cases, if you have a low-key at-home business, especially part-time (in addition to your 9:00-to-5:00 job), your homeowners' or tenants' insurance may cover you and it may even cover your computers. If not, you'll need a special floater policy to cover the office equipment.

If you're planning to work at home on your employer's behalf, your company needs to think about its liability exposure, too: What happens if you fall while working at home? With more people on staff working from home at least one day a week, it's a statistical likelihood accidents are going to happen at home.

TAXES

Taxation is the trickiest part. You want to deduct as much as you can, but you need to be careful not to overstep, since a Schedule C home business (named after the tax form) is a red flag to the IRS, especially if your deductions eat up most of your income. You're on safest ground and can take the most deductions if home is your only place of business, if you're self-employed, if you turn a profit, and if you use a room and the equipment in it exclusively for business purposes.

It's toughest to take a home-office

deduction if you bring work home from the office. You can deduct some equipment if your employer mandates your having a PC as a condition of business, but that's likely to fly with the IRS only if it was specified when you were hired.

If you have a part-time business, you can take a middle ground and take deductions proportional to how often you use the equipment for business and how often for personal use. Given how cheap PCs are, you might consider buying a second for business and leaving the first for the family.

There are other ways in which the expenses for setting up a home office can vary. If you want a second or third phone line and you make the phone company aware that you're starting a business in your home, you will be charged business rates, which are usually higher than residential rates. Most home-based business entrepreneurs will not see any advantage to paying business rates. If you want a listing in the Yellow Pages, you need to pay business phone rates. By all means, keep your business funds in a separate account. Establishing a second personal checking account may be cheaper than a business checking account at some banks.

One piece of investment advice: You can salt away up to 20 percent of your profits into a retirement plan (called a Keogh or simplified employee pension) and deduct that from your taxes. It's a great deal.

Don't lie, but make sure you know the law before you set up your business. Talk it over with your accountant or lawyer. If you don't have an accountant, find one—who works out of the house. □

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Cyberspace: *The Great Equalizer*

By Rick Ayre

The intelligent use of on-line resources can make a small office seem the equal of large corporations or just make your small company the very best at what it does. Commercial on-line services such as America Online, CompuServe, and Prodigy, and the noncommercial Internet, provide a wealth of resources for small-office users.

There is so much to talk about in a piece about on-line resources that we need to narrow the focus to three functions: using e-mail to communicate, using search tools to find information, and using the World-Wide Web to put a on a pretty face.

E-mail is the least expensive and easiest way to have an impact on-line. A simple but practical way to use e-mail is to eliminate the hassles of phone tag by reaching out to people who are hard to get hold of by phone. A more complicated but practical use is to set up mailing lists. If you use commercial services such as CompuServe or MCI, you can create your own lists manually using client software such as WinCIM (for CompuServe) or MailRoom (for MCI). If you want to completely automate your mailing lists you can, but today only on the Internet: You pay a service provider for the use of Listserv or

Majordomo software on their Internet server, or set up an Internet server of your own.

Two kinds of mailing lists are popular. One is the standard newsletter. If your business needs to stay in touch



The home page for the Internet Business Center, a clearinghouse for small-business on-line services.

with customers on a regular basis—for instance, to provide them with updates to your product line—what better way than to blast them out a newsletter every week, or month.

Think of the second kind of mailing

list as your weekly book discussion group in cyberspace. Do you have a mobile sales force or some other group of people that is frequently on the road but needs to be involved in strategy discussions? Try using mailing lists for on-line discussion groups and information updates. It's the poor man's Lotus Notes or private newsgroup. For more information about mailing lists, see "Making the Internet Connection," *PC Magazine*, October 11, 1994. For information on how to set up a mailing list, see "The Internet Means Business," *PC Magazine*, May 16, 1995.

TERABYTES OF INFORMATION

It is just as easy for you to find information in cyberspace as it is for anybody else, no matter how big the company or where they're located. And a lot of information that people pay good money for is free on the Internet, or cheap on an on-line service.

The key to finding is searching smart. Know what the best tools are, know where the best databases are, and even know when the best time is to search. Among the tools to learn about if you choose to search on the Internet are Veronica indexes, which index Gopher servers, and Wide Area Information Service (WAIS) indexes for full-text searching. The most popular index on the

variety of applications and data. You'll also want to make sure your home system doesn't become obsolete soon after you purchase it: Today's power system will almost surely be considered entry-level in a year or two. Look for at least a Pentium/75 CPU with 8MB of RAM, a 540MB hard disk, and a Super-VGA display with a 15-inch monitor. A configuration of this sort can be had for under \$2,000. If you can afford more power, an extra \$500 to \$800 can get you 16MB of RAM—which can improve performance by 50 to 70 percent over an 8MB system—a Pentium/90 CPU, and a 730MB or 1GB hard disk.

Most systems today ship with a CD-ROM drive; to be ready for tomorrow's

applications, consider a quadruple-speed drive (for reviews of sound cards, CD-ROM drives, and speakers, see "Multimedia à la Carte," *PC Magazine*, March 28, 1995). Finally, a 16-bit sound card and at least a 14.4-Kbps (V.32bis) modem are essential. A faster 28.8-Kbps (V.34bis) analog modem can take a lot of the sting out of those connections to the office LAN and e-mail systems. Of course, you'll need to persuade your company's information services (IS) people to put a 28.8-Kbps modem on their dial-in connection, too. Prices for 28.8-Kbps modems start as low as \$200.

If your work is likely to be split between your home office and the road, you'll want a powerful notebook PC—

one with at least a 486DX4/75 processor, 8MB of RAM, a color display, and a 520MB hard disk (for reviews of portables, see "Power to Go," January 24, 1995, and "Multimedia Marvels," April 25, 1995). Expect to pay from \$3,000 to \$7,000. You may even want to consider making that your desktop solution, connected to an external keyboard and monitor, or even to a docking station. A two-computer setup isn't just an expensive luxury for home-office workers; it's a pain in the neck, since you have to keep the files on the two machines synchronized.

FAX AND PRINT

As useful as fax modems are, you should think about purchasing a real fax ma-

World-Wide Web is Yahoo, at www.yahoo.com.

If you choose to search on the commercial services, know about the big indexes there, such as Computer Database Plus, Health Database Plus, and Magazine Database Plus on CompuServe. These databases contain the full text of magazines and since they are updated daily, most text makes it into the database about a week after publication. Databases like these are available on many topics; just find the ones that are most valuable to you.

STOREFRONT ON THE WEB

Some say that it is appearance that counts. Even if you're a one-man operation, your Web page can be just as easy to find as ours or your biggest competitor's, and it can look just as cool. Web pages are interactive hypertext documents that you can place on the Internet to introduce users to your products, update them with news about your organization, and even lead them to other related pages on the Net. Many Web pages incorporate graphics, video, and even sound. The great news is that publishing on the Web is easy and fun. The bad news is that since anyone can publish on the Web, apparently most companies are. Get to the Web soon if you think you want to be there at all. Again, more details on the Web can be found in

"Making the Internet Connection" and "The Internet Means Business."

LOOK BEFORE YOU LEAP

Just getting started? Do you really want a bargain? Think carefully about those two questions. The commercial on-line services are easier to get onto (for complete details, see "The Changing Face of On-Line" in our issue of February 21, 1995), but the Internet has more to offer. You'll also pay less for Internet access, but you may spend more time figuring out how to use the Internet than actually using it, which can be more expensive in the end.

There has been a lot of talk lately about security on-line—mostly about the lack of it. Make sure you know what is secure, what isn't, and what you need to do to ensure the level of security appropriate to your work.

E-mail on the Internet is very insecure—no more secure, in fact, than a call on most cellular telephones. Don't discuss in e-mail anything you wouldn't discuss on the phone, unless you encrypt it. Secure transaction processing—financial transactions involving credit and the like—is possible but costly. All of that is changing fast, so the moral is plan now, and plan well.

On-line resources are plentiful, fast, and cost effective for small offices. And being connected is the future of computing. □

chine. Sending faxes from a PC is convenient only when the material to be sent originated in that PC; the process of scanning existing paper documents, saving them, then queuing them up for transmission is far slower than just dropping them into a conventional fax machine. Desktop fax machines are offered by many vendors including Brother, Muratec, Panasonic, Ricoh, Sharp, and Toshiba, and start as low as \$179.

Few home-office applications are print-intensive, so you won't need a 20-page-per-minute laser printer at home; a 4- or 6-ppm unit should be fine. But don't forsake print quality: Your correspondence, reports, and proposals must compete with those from people connected

to elaborate office printers. Compact laser printers, such as the Brother HL-630 (\$399; Editors' Choice, *PC Magazine*, November 22, 1994), Okidata's OL-400E (\$599) or Hewlett-Packard's LaserJet 4L (\$650) and 600-dot-per-inch LaserJet 5P (\$1,109) make sense at home. If you have regular access to a laser printer at the office and you want color printing at home, or squeezing every last nickel is essential, an ink jet printer such as Canon's BJ-4000 Bubble Jet (\$399) or compact BJC-70 (\$399), Hewlett-Packard's DeskJet 660C (\$599), or Epson's Stylus Color (\$699) may work—but don't fool yourself that no one will be able to discern your pages from laser output.

Finally, if you want to save money and desk space, look at one of the new crop of multifunction printers, which combine printing, faxing, convenience copying, and sometimes scanning in one box, usually for less than it would cost to buy each unit separately. Multifunction printers are reviewed in the feature "Swiss Army Printers."

SMALL-BUSINESS OFFICES

The small business's needs are similar to those of the home-office business—but must accommodate the diverse requirements of the small business's staff. Several phone lines and a telephone switch to manage them are essential, a separate fax machine is a necessity, and a small LAN will quickly pay for itself. Another necessity is a workgroup laser printer, such as the Hewlett-Packard LaserJet 4 Plus (\$1,839 list; Editors' Choice, *PC Magazine*, November 22, 1994), which can be connected directly to the LAN via an optional network interface card (NIC) and shared by several users. A desktop copier, offered by vendors such as Canon, Sharp, and Xerox, is also essential. Prices start at about \$400.

Pay particular attention to matching each worker's needs when buying small-office PCs. Although standardizing on a single PC for everyone in the office may at first make sense, it can be foolish (if you buy everyone a too-limited machine to save money) or wasteful (if all employees wind up with missile-launching monsters on their desks because one or two people needed that much power). You may want to consider Pentium-based systems for graphic artists and 486-based systems for those who only need a system for word processing and simple spreadsheet work.

Consistency can and should be applied, though, in networking those machines. For a start, buy reliable, name-brand NICs that allow any necessary tweaking to be done through software, rather than manually set jumpers. Use one brand and model NIC and you'll spend less time on setup and problem solving. Make your life easier by using a simple network cabling system. Simple 10Base-T Ethernet, over unshielded twisted-pair (UTP), should be fine. But hire a network contractor to pull wire and

An ordinary PC?

You're locked into doing one thing at a time:

You can finish that monster proposal

or you can hold that crucial conference call

or you can check your voice mail

or you can send that urgent fax to Philly.

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Your first network server should have sufficient power and capacity to be your only server for some time. That means lots of RAM (at least 32MB to 64MB) and lots of hard disk space (at least 2GB for a serious workgroup server). "Keep it simple" applies to the network operating system you choose as well. If you must maintain the network yourself, a simple, peer-to-peer solution such as Artisoft's LANtastic or Microsoft Windows for Workgroups system makes more sense than a NetWare or Microsoft Windows NT setup. With a peer-to-peer arrangement you can even double the server as a workstation for the receptionist or another light user.

Think a little about how system-level application software can make your small office run better. E-mail is a given, even if everyone in the office works in close quarters. Microsoft Mail for PC Networks 3.2 (street price of \$469 for server and ten user-licenses) and Lotus cc:Mail Desktop for Windows 2.1 (\$95 for post office plus \$495 for ten user-licenses) are two popular e-mail packages.

BRANCH OFFICES

Branch office needs are much like the small office's needs, with two additional considerations: industrial-strength network connections to the company's home office and other branches, and the political issues involved in liaison with corporate IS.

Those network connections begin with high-level LANs, perhaps with multiple servers. Several NetWare servers for simple file- and print-sharing, plus dedicated application servers for e-mail, databases, and proprietary client-server processes are common. Beyond those on-site servers, employees need access to the company's other on-line resources, through WAN connections via routers and fast telecom links such as ISDN or, if your connections will be constant and you can afford a much higher rate, a dedicated line leased from the phone company.

The political issues of coordinating IS operating in a branch office with the company's central IS operations can be a swamp. Certainly in areas of company-

wide standardization, such as the choice of hardware platforms, basic productivity software, accounting systems, and network operating systems, it makes sense to go along with corporate IS's preferences. But more specialized tools, especially those needed only in a branch office, should be chosen locally.

TELECOMMUTING CENTERS

Most companies relying on telecommuting centers (TCs) see them as pit stops, in effect, for workers whose jobs mainly involve face-to-face customer contact. It's essential for workers to be able to check in quickly, connect quickly, access



data quickly, meet with colleagues quickly—then get back on the road. Several large-scale TCs have gotten attention lately as paradigms of this stop-and-go style. IBM's huge TCs in Cranford, New Jersey and Toronto serve many salespeople who otherwise rarely see the inside of an IBM facility. And the U.S. government is in the game, too, with two telecommuting centers each in Maryland and Virginia, operated by the General Services Agency's Office of Workplace Initiatives.

In most TCs, employees check in, are directed to a temporary cubicle, and then set up their own notebook PCs, carried in with them. There is usually a quick-connect network port and a conventional multiline phone at each desk. Adjoining conference and presentation areas and videoconferencing rooms are often available. Copiers and fax machines are widely distributed. Bridges and routers connect workers' notebooks over WANs via high-speed telephone lines to distant of-

fices, as well as to e-mail servers on LANs. Conference rooms in TCs often have multiple network connections as well, so participants in meetings can connect their notebooks and exchange documents, call up documents from distant servers, and do other collaborative work on their computers.

MOBILE OFFICES

Truly mobile workers insist on being able to complete all, or almost all, of their work wherever they are. And they are highly communications-oriented, often dialing into remote systems many times a day for e-mail, order entry and status confirmation, price checks, and complex bid calculations.

This demands tough, reliable notebooks, with fast internal or PCMCIA modems. High-end notebooks with at least 486DX4/75 processors, 8MB of RAM and 520MB hard disks make more sense than more limited, lower-cost models, both for their ruggedness and for their features: These machines are truly replacements for desktop PCs, not secondary machines.

A hand-held cellular phone is often as important as a PC to a mobile worker. Though cellular modems have their compromises, are impractical for long downloads, and have high operating costs, they can be invaluable and are worth considering. Road warriors should also carry both IBM's pen-size Modem Saver, to find overvoltage systems that can destroy PCMCIA modems, and a pocket modem with its power supply, cables, and the usual hotel-room cheater cords, for those times when the tester says it's not safe to use the PCMCIA modem.

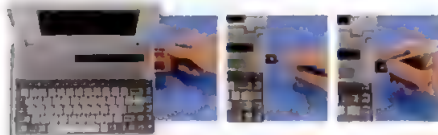
Portable printers aren't always necessary, but can avoid hassles and delays. The latest battery-powered printers, such as Pentax's truly tiny PocketJet (\$499), can be tucked into the notebook's carrying case. For heavier-duty portable printing requirements, Hewlett-Packard's compact, lightweight DeskJet Portable 320 (\$379) is hard to beat.

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Small-Office Software: *The Essentials*

Compiled by Leon Erlanger

Here are 15 software packages no small office should be without.

ACCOUNTING

Quicken for Windows 4.0 and QuickBooks for Windows 3.0

Quicken for Windows 4.0 (\$70) is the best personal desktop accountant you'll find. Its on-line connections to stock quotes, tax planner, and charts and graphs are unbeatable. And with QuickBooks for Windows 3.0 (\$160), you can create invoices and track accounts payable, inventory, and payroll. Home-office workers will also find it easy to separate family and business finances. Intuit Inc., 800-924-1040.

COMMUNICATIONS

Delrina WinFax PRO 4.0

The fax-software market is growing up, and it's dominated by Delrina's WinFax PRO 4.0 (\$129). Features such as Remote Retrieval and Fax Mailbox ensure that you'll get your fax no matter where you are. And Fax Broadcast lets you send out huge numbers of faxes without tying up your fax machine all day. Delrina Corp., 800-268-6082, 408-363-2345.

LapLink for Windows 6.0

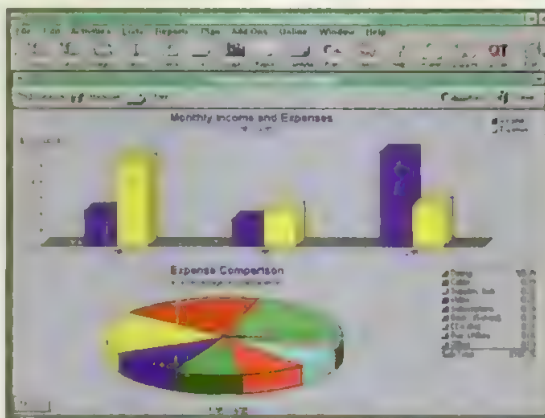
For those who are constantly transferring files from a notebook to a desktop computer, a software program that coordinates and updates documents is a must. LapLink for Windows (\$199.95) has led this field for years, and with each new incarnation it just gets more powerful.

This Technical Excellence Award winner from last year offers such convenient features as the ability to perform drag-and-drop file transfers. It's so flexible, you can hook into your main system through a serial cable, Novell network, modem (including cellular, PCMCIA,

and V.Fast models) or via an IrDA port and perform remote-control tasks. Traveling Software Inc., 800-343-8080, 206-483-8088.

Procomm Plus for Windows 2.11

Procomm Plus for Windows 2.11 (\$179) makes it easy to get onto a BBS or direct connect to a customer's PC. During in-



With a click of the mouse, Quicken for Windows 4.0 delivers detailed charts that give you an at-a-glance breakdown of your fiscal health right down to the last penny.

stallation, an automatic modem identifier checks to see what kind of modem you have and configures itself accordingly, and Procomm Plus offers several log-on scripts for popular on-line services. A *PC Magazine* Editors' Choice in March ("Do You Still Need Comm Software?", *PC Magazine*, March 14, 1995), Procomm Plus is one of the most reliable programs we've tested. It now boasts a solid faxing utility with auto-answer for data and fax, and support for distinctive ring, a phone-company feature that lets you assign up to four numbers to a single line. Datastorm Technologies Inc., 800-315-3282, 314-443-3282.

DATABASES

Lotus Approach 3.0 for Windows

Lotus Approach 3.0 (\$129) is specifically tailored for users without formal database training. Creating a database is simplified with automated Help, Smart Assistants, and numerous sample databases

for invoices, orders, and contact lists. Querying and generating reports are also intuitive and Lotus Approach lets you save your work in several standard formats, including dBASE's .DBF and Lotus 1-2-3's .WK1. Lotus Development Corp., 800-343-5415, 415-335-2200.

DESKTOP PUBLISHING

Microsoft Publisher 2.0

Microsoft Publisher 2.0 (\$99.95) combines an intuitive interface with a level of automation that exceeds anything found in competing products. The opening screen takes the guesswork out of creating simple brochures, flyers, and newsletters by asking you questions and then building the newsletter template. If you have text ready, you can just pour it in. Graphics placement is equally painless. When it's time to print, Microsoft Publisher asks you if your document printed acceptably, then offers a series of suggestions on what you can do to make it work better next time. Microsoft Publisher is no wimp, either; it has power underneath that stops just short of four-color output. Microsoft Corp., 800-426-9400, 206-882-8080.

INFORMATION, PLEASE

Microsoft Automap Road Atlas 4.0, Microsoft Automap Streets 1.0, and Microsoft Automap Pro 1.0

For city-to-city driving instructions and maps you can print out, the \$39.95 Microsoft Automap Road Atlas 4.0 is unbeatable. You can specify all your driving preferences and the program will figure out the best route, calculate the time it will take, and even figure out your gas expenses. Microsoft Automap Streets 1.0 (on CD-ROM) gives you a block-by-block view of several cities, and Microsoft Automap Pro 1.0 (\$399) lets you overlay databases on a map so you can figure out the most efficient way to visit, say, all nine of your New England clients during one business trip (assuming you know their ZIP codes or area codes). Microsoft Corp., 800-426-9400, 206-882-8080.

PhoneDisc PowerFinder

Of the several phone listings available on CD-ROM, PhoneDisc PowerFinder (\$249), with nearly 90 million separate entries, is the most flexible and complete list of U.S. residential and business numbers. You can search by business type, address, phone number, and name. PhoneDisc has ZIP+4 codes for 80 percent of its listings, and making labels (including postal bar codes) or exporting the information to your own database is just a click away. Digital Directory Assistance Inc., 800-284-8353.

ORGANIZERS, CONTACT MANAGERS, AND PIMs

DeskTop Set for Windows 4.1

Small-office users need to be able to track contacts, balance schedules, manage projects, and prioritize tasks. One way to do so is with organizers,

they manufacture, how much they bought from you last year, when you last spoke to them, and when to follow up—look to contact management software. Symantec's ACT! for Windows 2.0 (\$279) has long been a leader in this category, with up to 87 fields of data for each contact. Many fields can be customized via an easily navigable interface. Symantec Corp., 800-441-7234, 408-253-9600.

Ecco Professional 2.0

If simply tracking contacts is not enough, look for a personal information manager (PIM)—a tool that stores virtually any information, including reference materials and project details. Our current PIM favorite is NetManage's Ecco Professional 2.0 (\$279). The pervading themes in Ecco are outlines, folders, and links. Most data in the program is presented as an out-

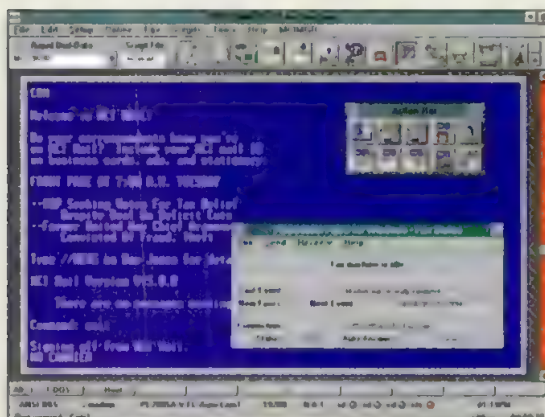
line—for example, your client might be the top level, the date of a recent appointment at the next level, and the details of the meeting indented below. And any item can be linked to any other, allowing data to be entered only once and show up in all appropriate places. NetManage Inc., 206-885-4272.

SUITES

Microsoft Office Professional for Windows 4.3

Nudging out competing software suites from Novell and

Lotus, Microsoft's offering (\$599) has the most consistent and closely designed set of Windows applications for the business user. The package includes such top-notch programs as Microsoft Word 6.0, Microsoft Excel 5.0, and Microsoft PowerPoint 4.0, plus a database, Microsoft Access 1.1, and a license for Microsoft Mail. Its word-processing, spreadsheet, and presentation-graphics software interfaces are well integrated, and there's a growing family of Office-compatible products. Microsoft Corp., 800-426-9400, 206-882-8080. □



A great communicator, Procomm Plus for Windows 2.11 includes a faxing utility with auto-detect and an off-line message handler with a toolbar for MCI Mail.

which have a phone book module for maintaining lists of contacts, and a calendar for entering appointments and todos. Our reigning champion organizer is Okna's DeskTop Set for Windows 4.1 (\$99), which impressed us with its intuitive and elegant interface, strong phone book, and extensive linking capabilities. Okna Corp., 800-438-6562, 201-909-8600.

ACT! for Windows 2.0

If you want to know more about your contacts than names and addresses—what industry they're in, what products

CONSTANTS

In any office, there are several constants in making effective use of computers. With PCs, a multiyear on-site service agreement is an essential part of a smart purchase. For peripherals, finding a nearby repair shop with quick-response service for the brands of printers, scanners, fax machines, and other equipment in use in a given office is a high priority. And though even the smallest office needs a designated network administrator, networking problems are almost always best solved by the network value-added reseller (VAR) responsible for the initial installation, not by a well-meaning PC buff in the office.

Setting up a nearly automatic backup routine is a second priority. Minicartridge tape drives conforming to the QIC 80 (125MB uncompressed, 250MB compressed per tape cartridge), QIC 3010 (340MB uncompressed, 680MB compressed), and QIC 3020 (680MB uncompressed, 1.3GB compressed) standards are appropriate for backing up desktop PCs and sell for between \$125 and \$400. Choose a QIC format that can back up your entire hard disk on one cartridge. With its higher capacity (generally 2GB to 4GB) and faster performance, digital audio tape (DAT) is more appropriate for server-based backup. Both QIC and DAT tape drives can be controlled by software that makes regular, unattended backups overnight. Even more important than the backup hardware and software is assigning one person the responsibility for swapping tapes and cataloging and storing them (including moving some off-site, perhaps to a bank box).

Finally, protect equipment in any setting from power surges and blackouts. Prices for uninterruptible power supplies (UPSs) have fallen to the point that it's practical to include one on the purchase order for every PC. If you're unwilling to protect every machine in the office, at least make certain that all servers, routers, bridges, and telephone switches are protected.

Workers in small offices prove every day they can compete with the biggest competitors, leveling the field with quick action, a focus on customers' real needs, and the technological edge of the right computer and communications systems. □

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AT THE SOUND OF THE BEEP...

Sleek, simple, and ready-to-handle faxes and voice mail: These nine packages let any small or home office seem like it has the resources of a corporate giant without busting the budget.

By M. David Stone

Did you ever dream of zipping through mounds of voice mail via an intuitive Windows interface? Now you may be in luck. Thanks to a new wave of voice-enabled modems, inexpensive voice mail software is a reality. Virtually any small office will be able to get a taste of sophisticated voice mail functionality clothed in an easy-to-use interface without splurging on costly hardware.

These packages, most of which rely on voice modems, are harbingers of a wave of new products aimed at integrating computers and telephones. By next year, the *computer/telephone in-*



► IN THIS REVIEW

Products reviewed:	
<i>Cheyenne BitWare for Windows 3.24</i>	143
<i>ExpressFax+ 3.0a</i>	145
<i>FaxWorks Voice 3.0</i>	145
<i>MultiExpressPCS 3.2</i>	159
<i>Multimedia Connect 1.6.2</i>	159
<i>ObjIX Media Manager 1.03</i>	163
<i>QuickLink MessageCenter 2.0</i>	164
<i>SuperVoice 2.0e</i>	166
<i>VoiceFX 3.0</i>	170
Answering Machines on Steroids	142
Messages Without the Machine	144
Voice Mail-Equipped PCs	150
Telephone Meets Sound Card.....	152
Creative Labs' Phone Blaster:	
Not Just Games.....	160
The Next Step Up:	
Beyond the Voice Modem.....	170

tegration (CTI) software market is expected to have quadrupled since 1991, rising to \$1.2 billion (according to the Alliance of Computer-Based Telephony Application Suppliers). Much of this market will grow from large call centers, such as customer-support lines, using the *Telephony Services Application Programming Interface* (TSAPI), a communications specification from AT&T and Novell for connecting phone switches to servers. Microsoft's bundling of its own standard, *Telephony API* (TAPI), into Windows 95 will only expand the end user telephony market.

But you don't need to run a call center or wait for Microsoft Windows 95 before you add telephony to your small office. We reviewed nine PC-based voice mail (and fax) packages that run on standard fax modems equipped with a voice-processing chip set (also called voice modems).

Listening to your messages via the PC is an enormous improvement over the telephone; the truth is that the telephone keypad is a horrid interface for controlling voice mail or even dialing a phone number. If you hit the wrong key, you're stuck—there's no way to backspace. And with voice menus, you have to wade through a spoken message at every step. Even worse, if you keep old messages, trying to find a message to replay later can be a frustrating experience. Consider how much simpler it would be if you could see a list of your messages on-screen, complete with comments you've added to old messages. You could easily find and play any message without wading through a mound of useless voice mail.

All nine products reviewed here provide just this solution. All but one are best suited for the home office, because they handle only one voice mail line (which can have multiple mailboxes and users).

Even though a package offers multiple mailboxes, the voice mail interface is available only for the user of the software-equipped PC; other users will have to retrieve their messages the old fashioned way—over the telephone.

Most of these packages can run on a nondedicated PC equipped with a voice modem. And most will let you record and

play back messages through a sound card equipped with speakers and a microphone. By running in the background and only requiring a phone and a modem, the package provides voice mail at low cost. And the voice messages don't take up a lot of hard disk space. About 500K per minute is standard; with compression, you can store a minute in 120K (although sound quality degrades)—considerably less space than a minute of CD-quality sound.

But for full-time voice mail, we recommend a dedicated computer. In fact, a dedicated voice mail system is the ideal task for an older, slower computer that you've just replaced with a hot new system (though you may want to upgrade to a faster hard disk). Combine a dedicated PC with our Editors' Choice-winning VoiceFX 3.0 and you'll have an inexpen-

• VoiceFX 3.0

When small offices look for voice mail software they can grow with, the choice is obvious: Orion Telecom's VoiceFX 3.0. This versatile DOS-based package is the only one to handle up to four phone lines, offer auto-attendant capabilities, and provide exten-

sive fax-back and fax-on-demand features. The graphical interface recreates some but not all of the features you're used to from Microsoft Windows. (And a Windows version with the same features should be available by the time you read this.) All told, it's a good value for small businesses that can afford to dedicate a PC solely to voice mail.

If you're looking only for voice mail, Cheyenne BitWare for Windows 3.2, Global Village Communication's FaxWorks Voice 3.0, and Syncro Development Corp.'s Multimedia Connect 1.6.2 will all do just fine.

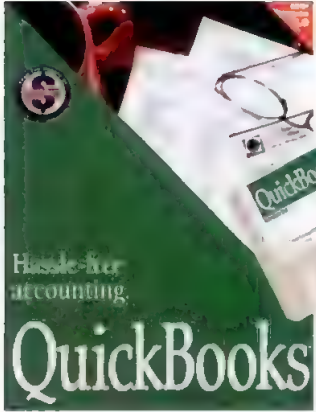
Pacific Image Communications' SuperVoice 2.0e and Smith Micro Software's QuickLink MessageCenter 2.0 stand out for their advanced scripting and fax-on-demand functionality, respectively.

With advanced scripting, SuperVoice lets you redefine Touch-tone

menus to enable or disable features or simply assign them to different tones. SuperVoice also offers full integration of voice and fax features and a full set of voice mail features such as pager notification. The one weakness in SuperVoice is its fax-back and fax-on-demand; you're limited to a maximum of ten documents between both features.

QuickLink MessageCenter offers all the right features—from total integration of fax and voice messages in each mailbox to automatic message notification by pager. The real strength of this program is its fax-on-demand, which provides up to 99 fax documents in each of ten mailboxes and automatically generates a list of the documents in each mailbox for easy maintenance. But the program doesn't offer fax-back, and the total of ten mailboxes is somewhat limiting if you want to set up both a voice mail and fax-on-demand system.





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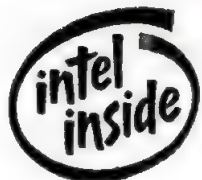
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- 340MB Removable Hard Drive (810MB Max)
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sive, top-quality voice mail solution that's a good fit for offices of up to about 15 people. Most of the other choices are highly suitable for offices of up to about 5 people and can sometimes be stretched even further.

REVIEW CRITERIA

To qualify for this roundup of small-office voice mail packages, these products had to provide voice mail and fax capability, work with mainstream voice-modem chip sets (or be bundled with a voice modem), be shipping as of early spring 1995, and work right out of the box without further software development. We also wanted a modern GUI (OS/2 or Windows) but would review a DOS-based product if there were some significant value warranting its purchase. We didn't set a price ceiling, but all packages came in under \$100 (not including modems). That filter netted us one DOS-based product and eight Windows-based products: six that were software-only, and three that included a modem. We reviewed the DOS application, Orion Telecom's VoiceFX, because of its multiple-line and private branch exchange (PBX) support that surpasses the functionality of the eight Windows programs and is still a low-cost solution requiring no additional programming. What's more, VoiceFX gives you a GUI in DOS.

All of these packages work with one or more of the chip sets found in standard voice modems. Alternatively, you can skip installation and purchase many of these and comparable products built into a new telephony PC (see the sidebar "Voice Mail-Equipped PCs").

It's important to understand what these products can and can't do. Most important is that with one exception, they support voice mail over one phone line using one modem. This means that with all but VoiceFX, you can't plug two or more phone lines directly into your voice mail system.

But it doesn't mean that you can't have two or more phone lines coming into your office. The trick is to get a small *telephone switch* (a mini-PBX) that can handle 3 to 8 lines from the phone company and 6 to 20 in-house lines. Depending on the number of lines, the switch

should cost roughly \$700 to \$1,300. You can program the switch to transfer all incoming calls on the outside lines to the one voice mail line. As long as you have only one caller at a time for the 30 to 60 seconds it takes to handle a call, that one

voice mail line will be enough.

As a rough rule of thumb, one line should be acceptable for up to about 5 people if you don't use a human receptionist or up to about 15 people if you do. The one program reviewed here that can

The Voice Mail Spectrum



THIRD-PARTY VOICE MAIL SERVICES



SINGLE-LINE PC-BASED VOICE MAIL

	THIRD-PARTY VOICE MAIL SERVICES	SINGLE-LINE PC-BASED VOICE MAIL
Products	- Local phone-company voice mail services, such as Bell Atlantic's Answer Call. - Operator answering services.	- Any voice mail package in this roundup, including FaxWorks, QuickLink, and VoiceFX. - Single-line packages with proprietary hardware, such as Talking Technology's Bigmouth.
Number of users	1 to unlimited.	1 to 5.
Cost	\$10 to \$50 per month.	\$50 to \$380 (not including hardware).
You'd want the products when you...	- Don't need sophisticated features such as integration of fax and voice messages. - Don't want to own or lease equipment. - Want clients always to reach a person rather than a machine (operator answering service only).	- Need moderately sophisticated features such as pager notification. - Have either one phone line or a switch with up to about five incoming lines and light traffic. - Have a one- to five-person office.
Benefits	- No large start-up cost. - Sounds professional. - Reliable. - No maintenance. - Will answer the phone even when the line is busy.	- Low cost. - No monthly fees. - Works with a single line, Centrex, or an in-house phone switch. - Simple to set up and maintain. - More flexible interface than a phone keypad. - Can handle fax.
Drawbacks	- No advanced fax-on-demand features - No integration with your phone system for call transfers - Monthly fee adds up - Additional cost for each new user - No message-waiting light	- Can handle only minimal phone traffic. - Most programs offer little or no integration with a telephone switch. - User must install, maintain, and administer system. - No message-waiting light.

Telephony Software

handle up to four lines, VoiceFX, should be able to handle a typical office of 15 people without problems and stretch to still larger offices if there's light-enough telephone traffic.

The level of sophistication for these

programs varies greatly. For example, only Novell's ExpressFax+ 3.0a, Syncro Development Corp.'s Multimedia Connect 1.6.2, Smith Micro Software's QuickLink MessageCenter 2.0, and VoiceFX support call transfer, so you

can use the voice mail system to transfer calls to another line, such as a receptionist. And only VoiceFX offers an *auto-attendant*, which will let callers specify an extension by using a Touch-tone phone and then will ring the extension or automatically send the call to right mailbox if the line is busy or no one answers.

Pacific Image Communications' SuperVoice 2.0e, however, offers a feature that, from the caller's perspective, seems to provide the same capability. SuperVoice asks what extension to ring and simply beeps the PC on which it's installed. If no one picks up the phone, the program goes to the proper mailbox and plays a greeting. To the caller, it sounds as if the program is a full-scale auto-attendant.

All of these programs provide basic answering-machine functionality, and all except Multi-Tech Systems' Multi-ExpressPCS 3.2 and ObjIX Media Manager 1.03 provide multiple mailboxes so everyone in your office can have one. Most will auto-detect fax calls based on fax tones, and several provide *distinctive-ring* support. (Distinctive ring is a phone-company service that works like an old-style party line, providing different rings for different phone numbers on a single phone line.)

More than half the packages offer one or more kinds of *message notification*—by pager, fax, or voice message. Note too that five of the programs—Cheyenne BitWare for Windows 3.24, Global Village Communication's FaxWorks Voice 3.0, QuickLink MessageCenter, SuperVoice, and VoiceFX—let callers ask for fax documents on the same call (*fax-on-demand*) or on a call back to a different number (*fax-back*), or both.

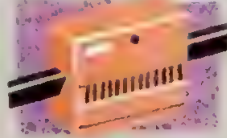
There are several products that didn't make it into this roundup that are worth mentioning: Delrina's WinFax Lite 4.0 with Voice Messaging and Thought Communications' FaxTalk Messenger were in the middle of major revisions and should ship the time you read this. The newest version of WinFax Lite—to be bundled with several OEM packages—will offer ten voice mail boxes, basic answering-machine functions, and of course faxing capabilities. This version will not include fax-back or fax-on-demand but should discriminate between incoming voice and fax calls.



MULTIPLE-LINE PC-BASED VOICE MAIL



HIGH-END PC-BASED VOICE PROCESSING



SWITCH-INTEGRATED VOICE MAIL

- VoiceFX.
- Complete Communicator.
- Other multiple-line packages.

1 to 30.

\$300 to \$1,500.

- Have more phone traffic than a single-line voice mail system can handle.

- Low cost for multiple lines.
- No monthly fees.
- Works with multiple lines, Centrex, or an in-house switch.
- Relatively simple to use.
- Simultaneously handles incoming calls and message retrieval.
- Software may include auto-attendant.

- Limited growth and integration with telephone switch compared with more expensive solutions.
- User must install, maintain, and administer system.
- No message-waiting light.
- GUI features available to only one user.

- Speechmaster, SuiteTalker, Talkie.
- Other programs that run on special-purpose telephony cards such as Bicom, Dialogic, and Rhetorex cards.

10 to 100.

\$1,000 to \$3,000.

- Have heavy call traffic.
- Require custom software for special needs such as integration with a database.
- Need some of the special telephony capabilities of the higher-end boards.

- Sophisticated customization.
- Better switch integration.
- Normally installed and maintained by a VAR.
- Simultaneously handles incoming calls and message retrieval.
- Auto-attendant available in most software.

- Requires sophisticated telephony and computer knowledge to install and customize.
- Relatively high price.

- AT&T Definity Audix, AT&T Intuity, AT&T Partner.
- Centigram's Voice Memo.
- Northern Telecom's Meridian Mail.
- Third-party products built on Dialogic-class boards.

50 or more.

\$1,600 to \$90,000.

- Want tighter integration between your switch and the voice mail system.
- Want the convenience of programming the switch from the keyboard rather than a telephone keypad.

- Full integration of voice mail and switch.
- Installed and maintained by a vendor.
- Unlimited growth capacity.
- Can handle heavy call traffic and message retrieval.
- Auto-attendant available in virtually all software.

- Can be extremely expensive.
- Proprietary architecture.
- Not customizable by end user.

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ESTIMATED
SELLING PRICE

HIGHLIGHTS

Telephony Software

We review nine applications that act as multiple-mailbox voice mail and fax systems and require only standard PC hardware and one phone line. The products in this roundup, besides allowing you to control all your phone and fax calls in one place, offer small businesses a sound way to assume the presence of a larger business. And they are priced well within the budget of a small office; the software is usually bundled with a voice modem or is available separately for \$50 to \$150.

THE FAX MODEM that you use may not work with these packages. All the products reviewed here use the voice-processing chip sets or DSPs in

Also being revised was Ancilla, from Kalman Technologies, which is now resold by Creative Labs with its Phone Blaster. (See the sidebar "Creative Labs' Phone Blaster: Not Just Games.") OCTuS's PTA comes bundled with the Spectrum Mwave line of voice cards. PTA requires you to use its OCTuLink—a dongle that connects the phone to the PC—for Caller ID reporting, real-time phone control, and other advanced functions. You can also get a version of PTA that runs on top of the Sound Blaster or any other MPC-compliant sound card for \$59. Another \$59 module gives you fax using a Class 1 or 2 fax modem. Finally, although we found several OS/2 programs, all carried price tags of \$1,500 and up, making them a bit unrealistic as truly small-office solutions.

These products address a subset of small-office telephony needs. But there are many other telephony options, both dependent and independent of the PC. Indeed, because the telephone is your primary point of contact with the outside world, we strongly recommend you consider all of these options:

- Private answering services, for exam-

today's voice modems, and you need software that's designed to work with the particular chip set. Each chip set manufacturer follows its own specifications, and there are even variations for different chip sets from the same manufacturer. You're always safe using software that's already bundled with a modem.

THE INTEGRATION of voice and fax messages that some of these products provide can give you sophisticated automation. Additional features such as fax-back, fax-on-demand, the ability to leave a voice or fax message in a mailbox, and notification of urgent messages can be easily set up on some systems. But remember: The

ple, let callers speak to a live person even when all of your phone lines are busy (see the sidebar "Messages Without the Machine").

- If you have more than one incoming phone line and don't want to buy a telephone switch, you might consider a multiple-line answering machine such as Bogen Communications' Friday (see the sidebar "Answering Machines on Steroids"). But for more capacity, consider the T-Modem from Centrepont (613-235-7054); this internal board or external box shares three lines across four extensions. Unfortunately, we did not receive the T-Modem in time for this roundup. We can tell you that along with good switching functionality, it offers voice mail and can function as a fax modem. But the maximum of four extensions makes it appropriate for only a very small niche.

- For up to four voice mail lines, the Editors' Choice-winning VoiceFX is still a viable solution—particularly when combined with a small telephone switch. There are also proprietary voice mail solutions available with small-office switches from vendors like AT&T (\$1,600 for

more voice and fax messages the system needs to handle, the more hard disk space is required—not always an option for the small office.

MANY DIFFERENT OPTIONS, naturally, may provide the right telephony solution for your business. They range from a humble \$100 answering machine to full-scale voice mail systems for Northern Telecom—or AT&T-class phone switches that cost tens of thousands of dollars. Other choices include voice mail services—from the local phone company, for example—and PC-based applications custom-written for higher-end voice-processing cards such as those from Bicom, Dialogic, and Rhetorex.

voice mail board plus approximately \$4,000 for a two-line switch).

- For users who don't mind rolling their own voice mail system, there are any number of developer tools that run on multiple-line voice processing boards costing \$300-\$1,500, such as those using Bicom, Dialogic, or Rhetorex voice boards. (See the sidebar "The Next Step Up: Beyond the Voice Modem.")

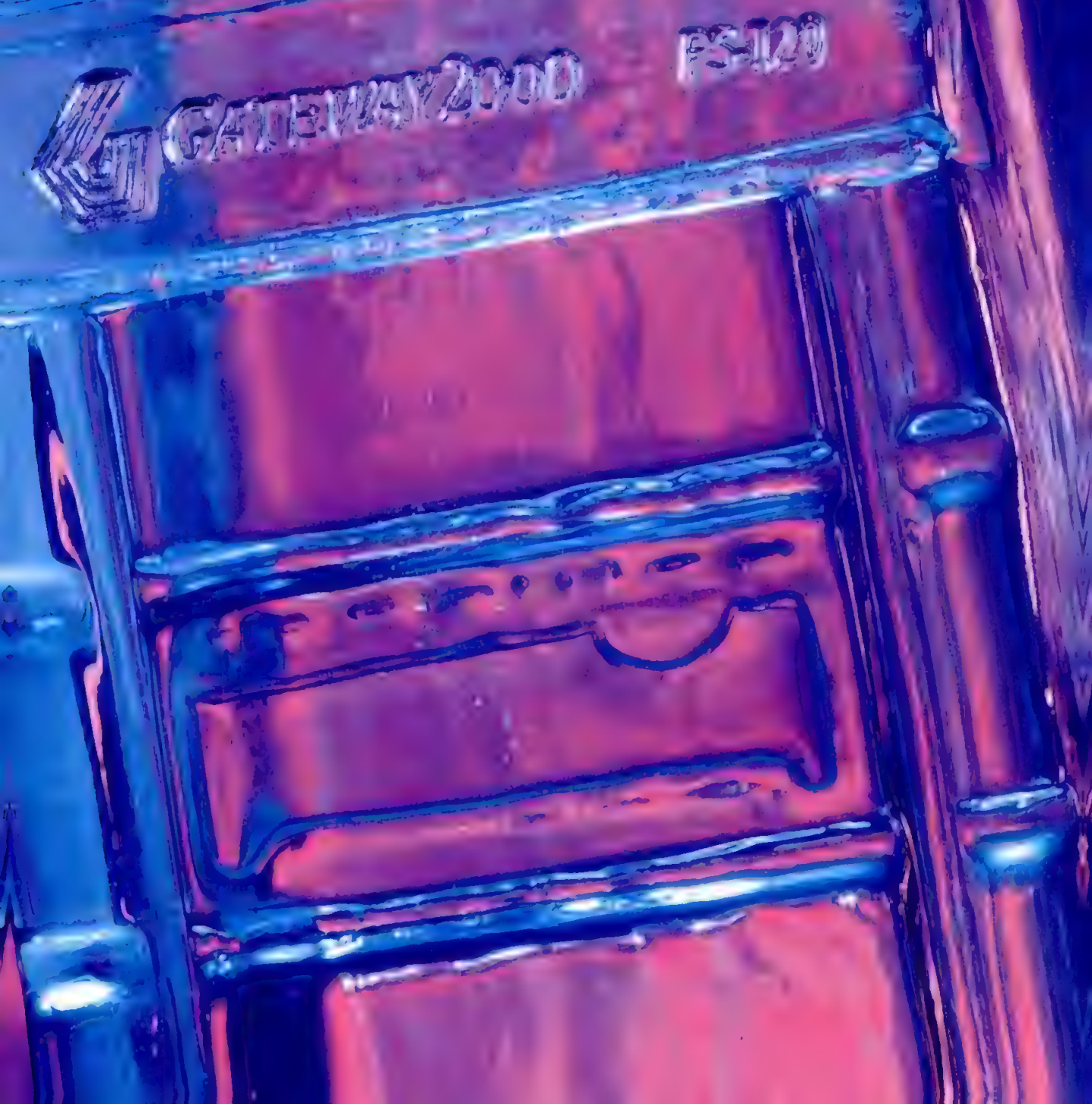
Similarly, Talking Technologies (510-522-3800) and Natural Microsystems (508-650-1327) sell programs for the small office (and larger sites) that range from \$295 to \$1,295 and vary in capacity from 1 to 16 lines (even more in the case of Natural Microsystems products). These packages work with special-purpose voice mail boards. They don't offer built-in fax capability, but they do offer features you won't find in most of the software reviewed here, like the ability to build an interactive voice-response (IVR) BBS that callers can work their way through to request information. And if you want more than message-taking features, they may suit your needs better than the programs covered here.

A WORD ABOUT MODEMS

To a large extent, the products in this story are now coming to market because of the new voice modems. Unfortunately-

Our Contributors: BRUCE BROWN, JOHN R. QUAIN, and M. DAVID STONE are contributing editors of *PC Magazine*. TODD SPANGLER is a staff editor at *PC Magazine*. DAVID GREENFIELD was the senior editor in charge of this story.

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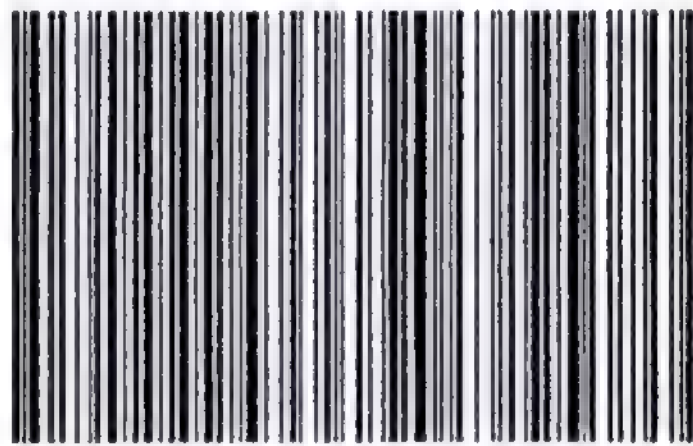
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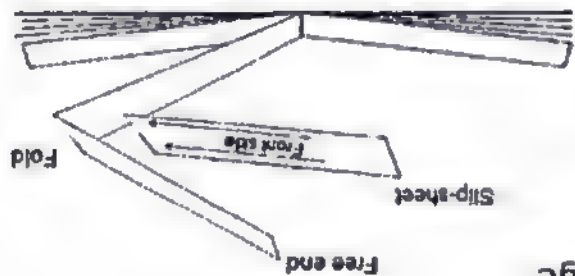


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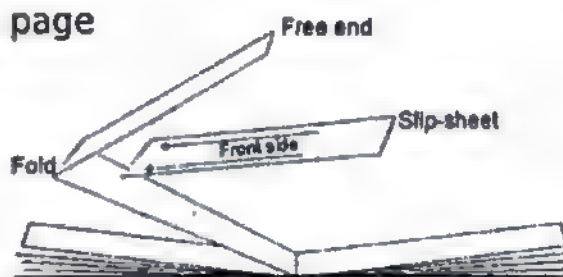
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Foldout slip-sheet

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1. Front side touching the free page
2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



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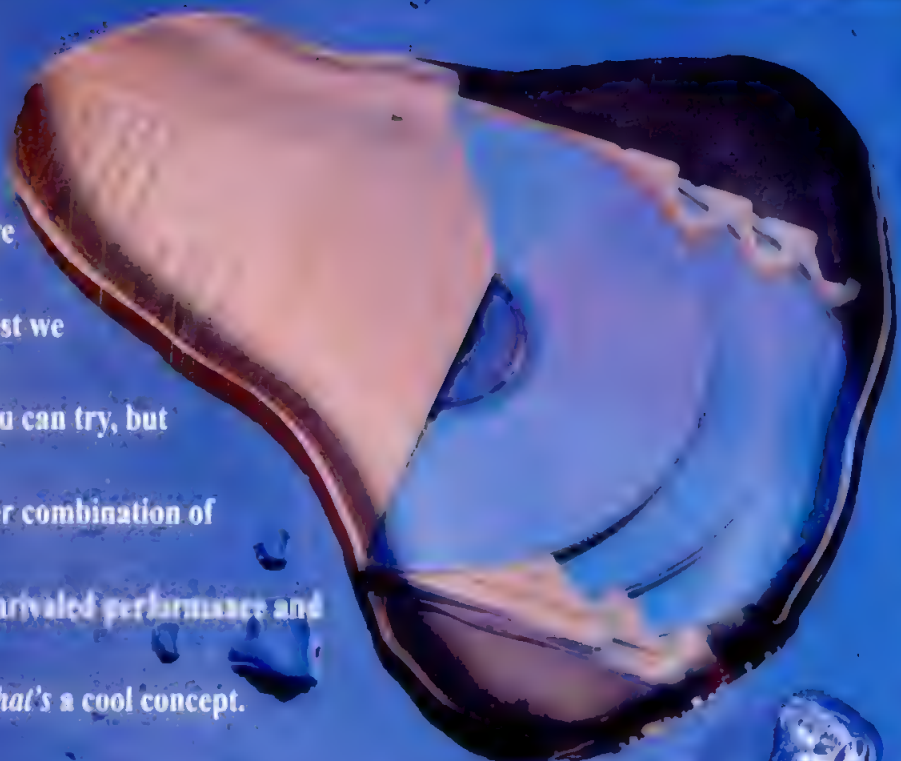
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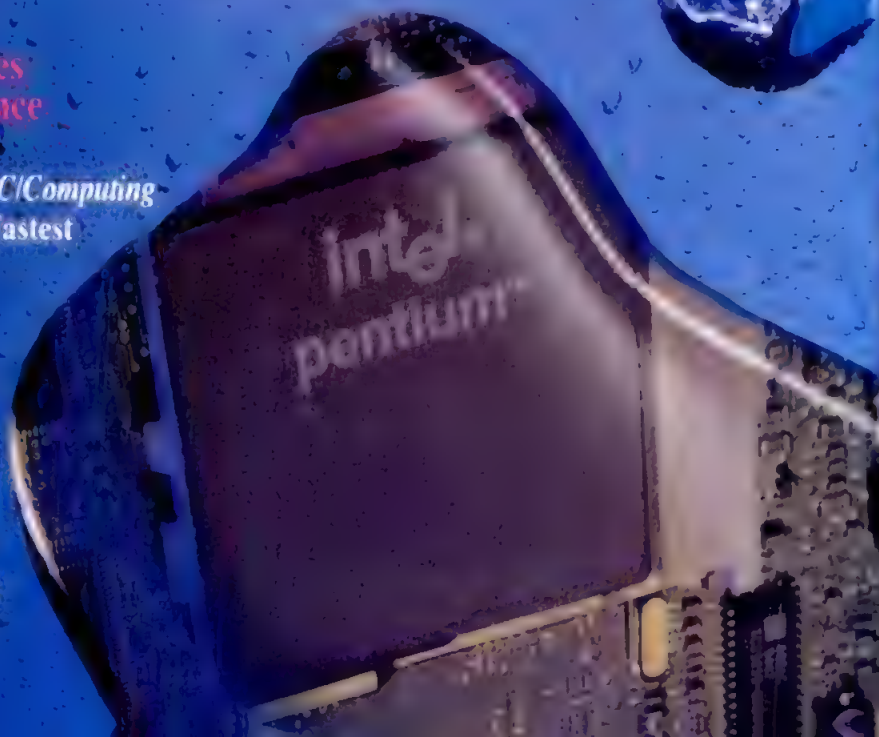


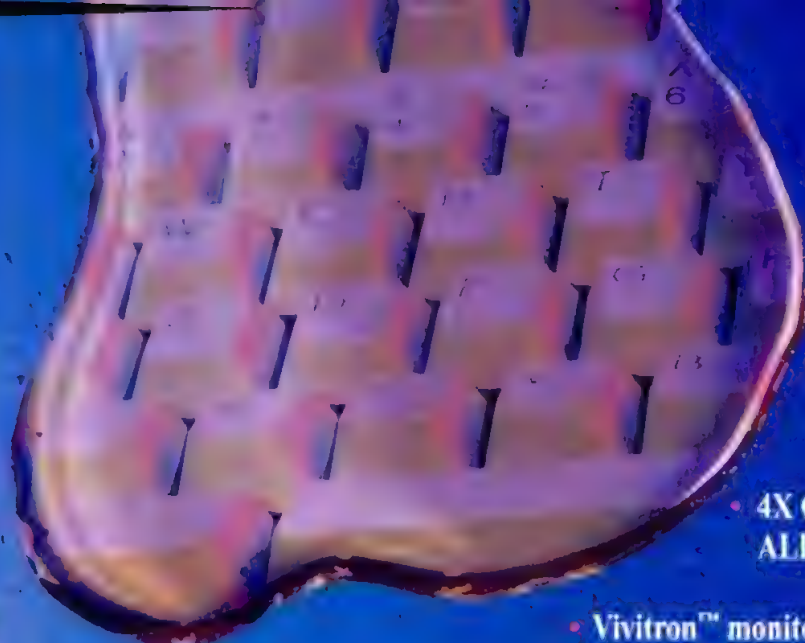
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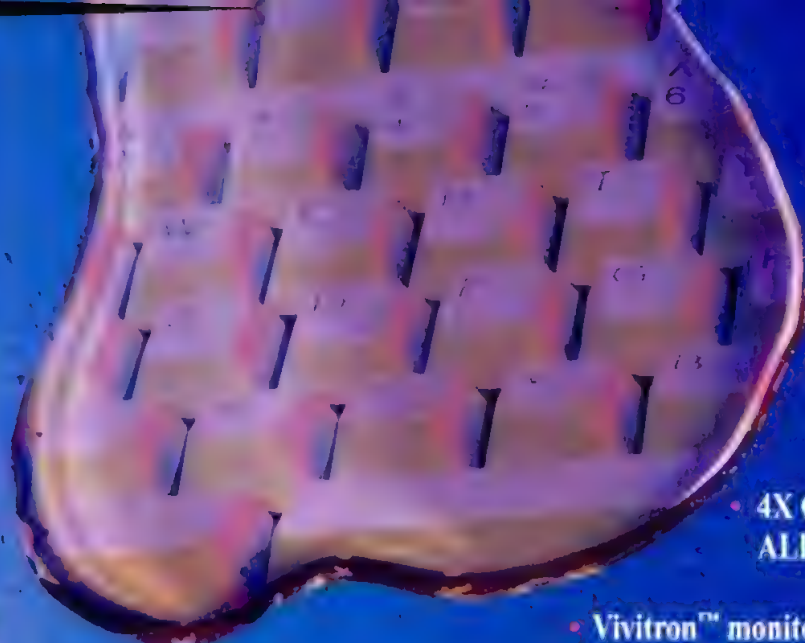
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The Best Value

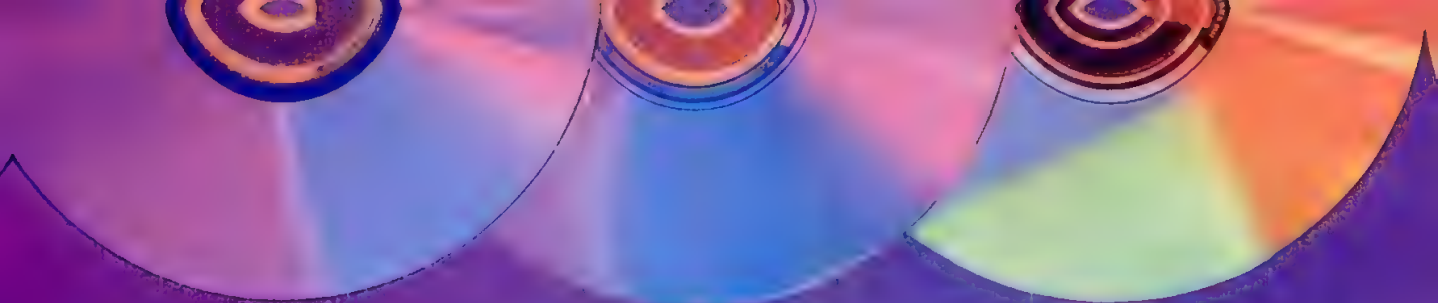
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- 7-Bay Desktop Case
- AnyKey Keyboard & MS Mouse 2.0
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- 3-Year Limited Parts Warranty

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P5-90 \$2199

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- TelePath IIv 14.4K Fax/Modem Communication Center
- 3.5" Diskette Drive
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- 9-Bay Tower Case
- AnyKey Keyboard & MS Mouse 2.0
- MS-DOS 6.22 & WFW 3.11
- MS Office Professional 4.3,** Bookshelf & Money 3.0
- 3-Year Limited Parts Warranty

\$3999

†Generations Software Collection

- Microsoft Encarta™'95 • MS Bob
- MS Money 3.0 • MS Works 3.0 • MS Publisher • MS Publisher Design Pack • MS Cinemania®'95 • MS Bookshelf® • MS Composer Collection: Beethoven, Mozart and Schubert • MS Wine • MS Arcade: Missile Command™, Asteroids® Tempest™, Centipede® and Battlezone™ • MS Dinosaurs • Mayo Clinic® Family Health • and Mayo Clinic Pharmacist • plus dozens of popular MS entertainment games.

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ly, the modems—or more specifically, the chip sets in the modems—don't all follow the same standard for voice. That means you need software designed to work with the particular chip set in your modem—much as a DOS word processor needs the right printer driver to work with any given printer. TAPI promises to remedy this situation, in much the same way that Windows remedied the situation for printing by providing a common printer-driver interface.

But for now, every modem needs voice mail software that's designed to work with its particular chip set. For purposes of this discussion, these chips can be either the type traditionally dedicated to modem functions or digital signal processors (DSPs) that can be programmed on the fly by your software to act like a modem or sound card. (See the sidebar "Telephone Meets Sound Card.") Chip sets in the first group include products from Cirrus Logic, Rockwell International, Sierra Semiconductor, and ZyXEL. DSP chip sets include the likes of IBM's Mwave.

Each modem chip-set manufacturer that offers voice processing follows its own specifications, and there are even variations for different chip sets from the same manufacturer. To complicate matters further, two modems with the same chip set may have differences in firmware that affect one or more of the modems' features. During testing,

we found that some features in FaxWorks would not work on an external Zoom modem with a Rockwell chip set; these same features worked without problems on an internal Zoom modem with a different version of the Rockwell chip set and different firmware.

In general, programs that come as OEM-bundled products are more likely to be fine-tuned for specific versions of a chip set or firmware. But if you're buying an off-the-shelf program, you'll want to make sure it's intended to work with the particular model of modem you have. At

Answering Machines on Steroids

By M. David Stone

If you want something more capable than an answering machine, but PC-based voice mail seems like overkill—or you just don't want to leave your computer on 24 hours a day—you may be interested in one of these standalone packages: Friday, Fax Friday, and Cordless Friday from Bogen Communications and the Muratec VF1000 from Murata Business Systems.

Think of these packages as low-capacity voice mail systems. But with street prices of \$250 to \$800 and a maximum of four to ten mailboxes, they're better described as digital answering machines on steroids. In addition to multiple mailboxes, all of these packages offer pager notification and remote message retrieval. Some offer fax-on-demand and automatic fax- and message-forwarding.

Be aware of the gaps in features compared with PC-based voice mail programs. Most notably, none of these packages can print faxes, even though some can receive faxes and store them in memory. To print faxes, you'll need to retrieve them from or forward them to a fax machine or fax modem-equipped computer, either by phone or through a direct connection with a standard phone cable.

Bogen Communications (800-646-1447, 201-934-8500) offers a variety of choices. Friday comes in a one-line version, the FR1000 (\$399 with a typical \$300 street price), and a two-line version, the FR2000 (\$499 with a typical \$320 street price). Both provide three mailboxes for announcements only and four mailboxes for incoming messages, with remote

notification by pager or voice message. If Friday detects a fax, it will switch the call to an attached fax machine or fax modem. Both versions have enough memory for 18 minutes of recordings.

Fax Friday also comes in two single-line versions. The FR3110 (\$599 with a street

price of about \$500) can hold 50 pages of fax documents or 12 minutes of voice messages. The FR3120 (\$799 list and street) can hold 180 pages or 36 minutes. Cordless Friday FR4649 (\$599 with a typical street price of \$400) is similar to the single-line Friday but has six personal mailboxes, three announcement mailboxes, and an integrated cordless phone. Missing from Cordless

Friday are fax detection and switching. Variations of Bogen's Friday product family can also be purchased through AT&T.

Muratec Business Systems (214-403-3300) offers only one package, the Muratec VF1000. This single-line unit (\$399 with a typical street price of \$250) provides ten mailboxes, each of which can store both voice and fax messages. You also can set each mailbox to forward either or both kinds of messages and can change each mailbox's forwarding number remotely. The base unit has enough memory for 20 minutes of voice messages or 60 fax pages. You can double the capacity with a \$129 upgrade or quintuple it with a \$199 upgrade. Note that you can use any of the mailboxes for fax-on-demand documents, with one document per mailbox. All told, the VF1000's features put it somewhere between Friday and Fax Friday. □



The \$499 Friday FR2000 (above) offers digital voice mail for two lines; the \$399 Muratec VF1000 (left) stores both voice and fax.

Suitability to Task: Telephony Software

A PC-based voice mail and fax solution should do more than simply substitute one technology for another. We expect a telephony package to provide basic phone and fax-answering—and then some. It should be a full-featured, integrated, and robust messaging solution for a home or small office.

Primarily we expect each package to function as an **answering/fax machine**, but with richer features. The program should be just as easy to set up and

should retrieve messages and forward or print faxes just as effortlessly as its real-world counterparts. We also want the ability to store multiple greetings and easily switch among them.

Other features we look for include menus for callers, archiving old messages, and recording and playing back messages through devices other than a phone handset (most notably a sound board microphone and speaker)

With our **voice mail** task, we look at similar answering-machine functions as they apply to multiple

mailboxes. In addition, we expect advanced features such as forwarding messages and faxes to other mailboxes and letting callers leave messages in more than one mailbox on a single call. The system administrator should be able to direct messages and faxes from the default mailbox to specific mailboxes and ideally set up a basic auto-attendant and directory listing with automated call transfer.

The **message retrieval** features of each product are key to determining its overall usefulness. A user should be able to call in to retrieve faxes and voice messages, and the software should have automatic notification and forwarding—by pager, fax, or voice

message. We also consider the ease of message retrieval and the difficulty of configuring these features.

To round out a communications center, the

software must have **advanced fax features**: fax-on-demand and fax-back. We look at the maximum number of documents available for fax-back (which sends a fax to a caller at a different number) and fax-on-demand (which sends a fax on the same call). The program should also be able to generate a list of documents automatically, organize them hierarchically, and allow easy setup and system management.

Internal modems free up some desk space. Some offer a modem and sound card on a single board, and some offer echo-cancellation features so you can plug in a microphone and speakers to turn your system into a full-duplex speakerphone as well as a voice mail system. (A full-duplex speakerphone lets you listen even when you talk and eliminates the annoying tendency that standard speakerphones have of cutting off the first syllable or two of each comment you utter.) All DSP-based modems are internal.

As a practical matter, there isn't much difference for voice mail between having a DSP-based board in your system and having a traditional modem and a sound card. Playing messages through a sound card works just as well as playing them through boards that integrate a modem with audio capability. Note too that you can find internal modems—such as the Reveal Decathlon 500—with

standard chip sets for data, fax, and sound on a single card, without having a DSP on the card.

VOICE MAIL AND YOU

With these modems and any of the voice mail packages reviewed here, even the smallest office can appear larger than it really is. Almost all of the products will serve well in an office of up to about 5 people; most could be pushed to an office of 15 or so with a receptionist. The key requirement is that the telephone traffic be light enough so you don't need more than one caller at a time getting through to your voice mail. VoiceFX is a truly good fit for that 15-person office and is the only reasonable possibility in this roundup for still larger offices.

Cheyenne Communications Inc.

Cheyenne BitWare for Windows

BY M. DAVID STONE

Cheyenne BitWare for Windows 3.24, a descendant of BitFax Pro, is a better-than-average fax program with modules for voice mail and data communications. Version 3.24 offers an improved fit for single-mailbox systems, which makes it a good choice for both single- and multiple-mailbox voice mail. It also offers a new fax-on-demand feature that's worthy of notice. But BitWare is still a bit weak in communications-center

SUITABILITY TO TASK
Cheyenne BitWare for Windows

	Power	Ease
Answering/fax machine	Good	Good
Voice mail	Good	Good
Message retrieval	Good	Excellent
Advanced fax features	Excellent	Good

features, with fax and voice mail less tightly integrated than they should be.

Priced at \$99, BitWare is available for a wide choice of voice modems. Cheyenne says the program supports all versions of Cirrus Logic, Rockwell, and Sierra chip sets. BitWare is also available for AT&T's VCOS and in OEM versions for some Mwave-based modems. Currently, BitWare is bundled with modems from about a dozen manufacturers, including Best Data Products, Well Communications, Zoltrix, and Zoom Telephonics.

the very least, you'll want to make sure that it's intended for the chip set in your modem. And be aware that most programs supporting more than one chip set come in chip set-specific versions, so you'll want to make sure you get the right version.

If you're buying a modem first or separately, you'll want to consider whether you want an external or internal version. External modems offer status lights or LCD messages that some people find essential to communications troubleshooting. One external modem—the Zoom/Voice FaxModem VFX 14.4V—offers a *message-waiting light* to let you know when you have voice mail messages. (Lack of a blinking message-waiting light is a shortcoming of virtually all voice mail solutions; the exceptions are standalone answering machines and high-end business voice mail systems that work through the phone rather than your PC.)

Messages Without the Machine

By Todd Spangler

Subscribing to a voice mail service may be a good choice if you're looking for a hassle-free, no-hardware solution. An external service can be more functional and easier to operate than a PC-based system—but it can also be expensive.

Each of the RBOCs (Regional Bell Operating Companies) sells voice mail mailboxes accessible from a standard Touch-tone telephone. (See chart for a listing of prices.) You need only a phone to access messages 24 hours a day, and many of these services also offer features that may not be offered by PC applications. For instance, most services can notify you of urgent messages via pager, phone, or fax.

AT&T offers voice mail through AT&T True Connections (800-878-3500), a phone-number service that "follows" you anywhere using a 500 area-code prefix. MCI and Sprint plan to offer 500-number service this year.

Of course, many PC communications packages include fax and data communication in addition to voice mail. And unlike a software solution, a

voice mail service has a regular fee. Six months of US West's advanced services (\$97.50) costs more than the one-time price of Cheyenne BitWare for Windows (\$69, not including a modem).

Besides phone-company voice mail, you can get messages through tele-

ever you are, and greet callers with an off-hours recording.

For larger businesses, some phone companies offer voice mail through their Centrex services, phone-switching services provided at the RBOCs' central offices. On a nationwide scale,

Voice Mail Services Pricing

Company	Service	Price
Ameritech	Ameritech Voice Mail	\$12.95 per month (includes three extra mailboxes)
Bell Atlantic	Answer Call	\$9.00 per month (includes eight extra mailboxes)
BellSouth	MemoryCall	\$12.95 per month
NYNEX	Call Answering	\$12.46 per month (includes three extra mailboxes)
Pacific Bell	Pacific Bell Voice Mail	\$6.50 per month; \$2.95 per month per extra mailbox
Southwestern Bell	CallNotes	\$12.75 per month; \$4.00 per month for two extra mailboxes
US West	Business Voice MessagingService	\$12.75 per month; \$6.00 per month per extra mailbox; \$3.50 per month for message notification

For more information or to subscribe, call your local phone company's business office.

phone-answering services; they're more personal and sometimes lower-tech. But they typically are even more expensive than the RBOCs' voice mail—about \$20 to \$35 per month for voice mail and upwards of \$80 per month for a live receptionist. For the higher cost, these services will send and receive faxes, patch through urgent calls (not just messages) wher-

AT&T's Software Defined Network (SDN) Voice Mail and MCI's Network Voice Mail both offer network-based voice messaging for geographically dispersed companies. Larger systems provide richer features, such as 800-number access to voice mail and voice processing that greets callers with more elaborate interactive voice-response (IVR) menus. □

According to Cheyenne, some versions support speakerphone features (if the modems have them); otherwise, the different versions are identical. We tested the program on an external Zoom/Voice

FaxModem VFX 14.4V.

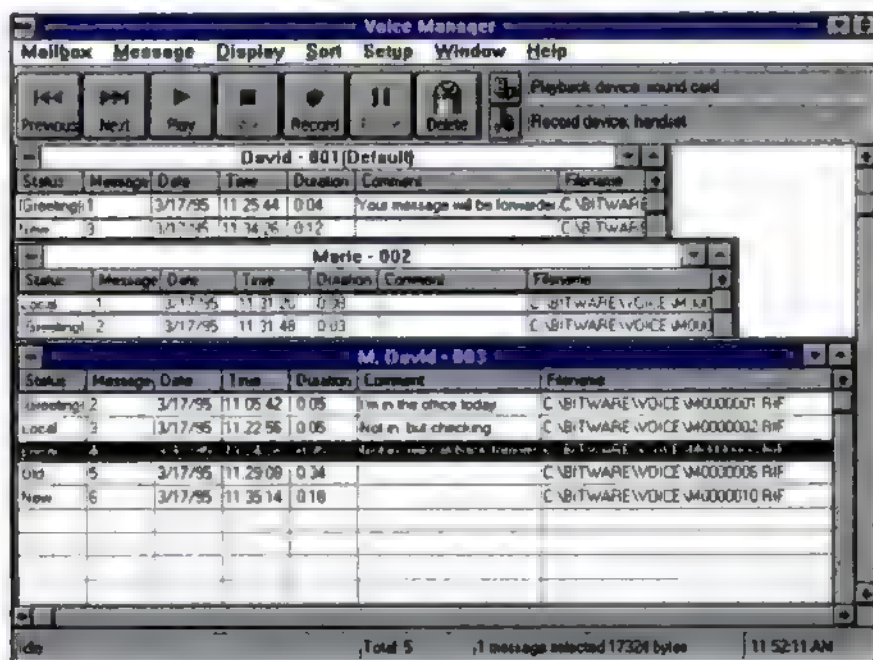
BitWare can take calls immediately after installation, but you'll want to change the greetings first. The program allows three kinds of greetings: a system greeting,

a mailbox-directory listing, and a default mailbox greeting. If you have a single-mailbox system, you'll want to toggle the first two messages off and record your own mailbox greeting.

If you have multiple mailboxes, you'll want to record a more appropriate initial greeting and directory listing. And of course you'll want to create the mailboxes. BitWare will let you record as many greetings as you like for each mailbox, set any mailbox for pager notification, and add a password to each.

BitWare's fax module works with the voice module but is largely independent of it. The program will detect and accept fax calls, but it puts all faxes in one fax-receive log. Someone then must deliver the faxes either by printing them, sending them to separate fax folders, or forwarding them using any VIM- or MAPI-based e-mail system. The lack of integration between fax and voice mailboxes undercuts the usefulness of the fax-forwarding and remote fax-retrieval features for multi-mailbox systems. But for offices that use VIM- or MAPI-based e-mail, BitWare's e-mail hooks make up for the oversight.

Finally, note that BitWare will let you define as many fax-on-demand mailboxes as you need and store as many documents as you like in each mailbox. You can also specify by mailbox whether to allow fax-back documents. The program doesn't generate a list of available faxes for



BitWare lets you see each mailbox in its own window and manage messages using VCR-like buttons.

callers, so you'll have to maintain one separately, but this is only a minor chore. For those who need them, the ample fax-on-demand and fax-back features are the best arguments for getting BitWare if it didn't come with your modem.

Cheyenne BitWare for Windows 3.24. List price: \$99. Cheyenne Communications Inc., 3 Expressway Plaza, Roslyn Heights, NY 11577; 800-243-9462, 516-484-5110; fax, 516-627-2999; Web, <http://www.chey.com/>.

Circle 448 on reader service card

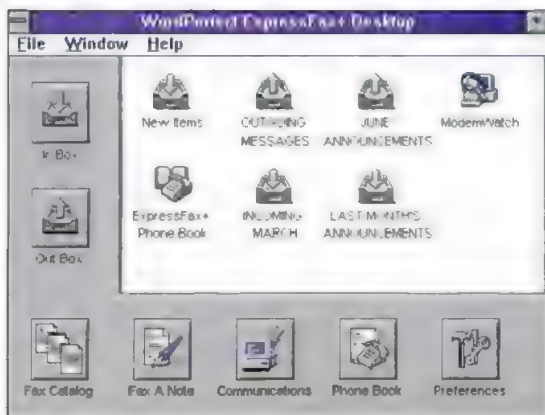
Novell Inc.

ExpressFax+

BY JOHN R. QUAIN

If advanced telephony sounds appealing but you're really not interested in elaborate fax-on-demand options or hundreds of mailboxes, ExpressFax+ 3.0a may be for you. As its name suggests, Novell's \$49.95 standalone software package is designed to send faxes in a jiffy. The company has also added a terminal-style communications module and basic answering machine functions. You won't find fancy fax-on-demand or voice-message broadcasting features, but ExpressFax+'s meat-and-potatoes simplicity is appealing.

Currently compatible with fax modems using the Rockwell chip set—including Supra Corp., U.S. Robotics, and Zoom Telephonics modems—ExpressFax+ for Windows was tested with an Infotel 14.4 Fax Modem with Voice Mail. Installation was straightforward. The ExpressFax+ desktop is reminiscent of Novell's PerfectOffice suite, with most of its features



With its large buttons, the spare ExpressFax+ desktop is reminiscent of Novell's PerfectOffice suite.

SUITABILITY TO TASK		
ExpressFax+		
	Power	Ease
Answering/fax machine	Poor	Excellent
Voice mail	Poor	Fair
Message retrieval	Poor	Good
Advanced fax features	N/A	N/A

conspicuously laid out on large buttons. Integrated in- and out-boxes hold voice, fax, and data messages.

ExpressFax+'s voice mail, intended for a small office with one or two users, has such simple features that the manual dedicates only two pages to it. Basically, it works like an answering machine with up to ten mailboxes and the ability to accept an incoming fax or voice message automatically. There's no speakerphone or voice dial-out option, but you can dial in to pick up messages, change the greeting, or leave a voice memo. Mailboxes don't get individual greetings, but ExpressFax+ can transfer incoming calls if you're hooked up to a PBX.

Fax handling is just as straightforward. You can send faxes directly from the program's desktop or by selecting the ExpressFax+ printer driver from within any Windows application. Emblematic of the program is its Fax A Note feature. It enables you to select a recipient from your phone book, add a heading, type a short memo, select one of eight cover sheets, and fax the note out immediately. It's fast and simple, if unsophisticated.

ExpressFax+ lets you forward faxes from the desktop but not from a remote phone. Although you can't set up fax-on-demand or fax-back, you can store frequently sent faxes as TIFF files for easy retrieval and transmission. For data communications, ExpressFax+'s terminal interface contains a stripped-down toolbar. You won't find automated scripts for popular e-mail or on-line services, but it handles all standard file-transfer protocols, such as Xmodem, Ymodem, and Zmodem. These functions are tied to the central phone book, which unsurprisingly lists just basic information.

ExpressFax+ is a tight little package that's targeted at users who want an integrated commu-

nications package but don't need extensive fax or voice mail systems. If you just want an easy, all-in-one package for your laptop, this may be it; users who want full-fledged CTI should seek a more sophisticated program.

ExpressFax+ 3.0a. List price: \$49.95. Novell Inc., 1555 N. Technology Way, Orem, UT 84057-2399; 800-451-5151, 801-225-5000; fax, 801-228-5377; Web, <http://www.novell.com>.

Circle 449 on reader service card

Global Village Communication Inc.

FaxWorks Voice

BY M. DAVID STONE

FaxWorks Voice 3.0 is a bit of chameleon. Because the package is strictly an OEM product, Global Village Communication customizes it for each modem it's packaged with; the changes extend to both features and interface. But the basic core remains the same. And in all its forms, FaxWorks manages the difficult feat of allowing easy startup while offering real depth—as a voice mail system, voice

SUITABILITY TO TASK		
FaxWorks Voice		
	Power	Ease
Answering/fax machine	Good	Excellent
Voice mail	Good	Good
Message retrieval	Excellent	Good
Advanced fax features	Fair	Fair

and fax message center, and fax-on-demand or fax-back system.

Setting up a single-mailbox voice mail and fax system involves little more than installing the program and optionally recording a new greeting. For multiple-mailbox systems, you simply add as many mailboxes as you need (up to 1,005). You'll also want to rerecord the system greeting to include the mailbox directory. Each mailbox gets a password to protect its messages against retrieval by others, but the system administrator can change passwords—which means that he or she can listen to any message.

FaxWorks does a nice job of organizing the messages in each mailbox, with a set of tabbed cards for new messages, old messages (those you've already listened to), new faxes, viewed faxes, scheduled faxes, and completed outgoing faxes. Callers can send faxes to specific mailboxes, and you

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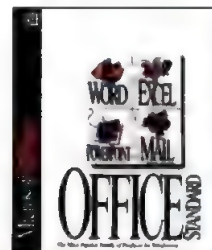
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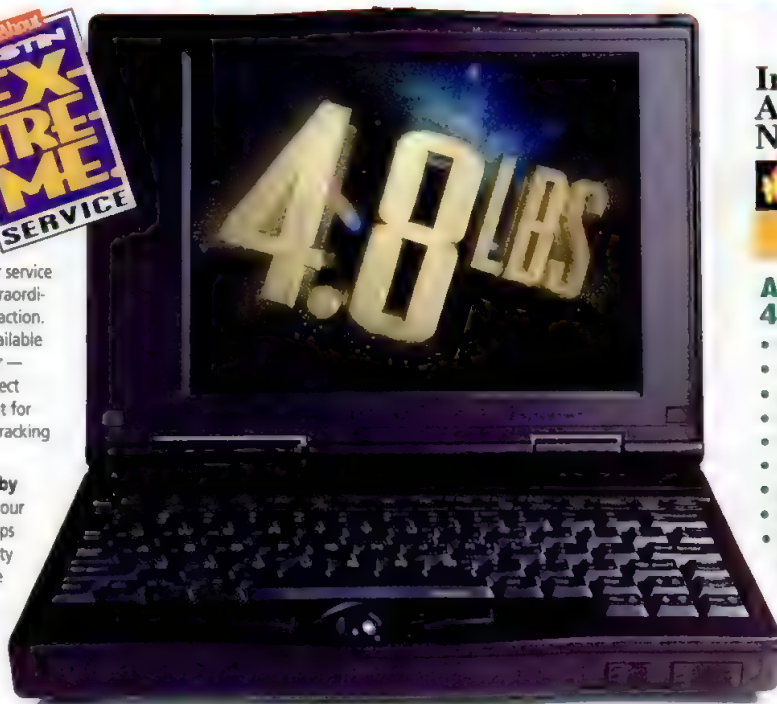
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CIRCLE 012 ON READER SERVICE CARD

Voice Mail-Equipped PCs

By Bruce Brown

You don't have to buy voice mail software, modems, and computers à la carte. Many vendors are offering turnkey, integrated systems with telephony hardware and software already installed. We tested telephony PCs from AST, AT&T, Compaq, IBM, NEC, and Packard Bell—five desktops and two portables. Each desktop comes with a double- or quad-speed CD-ROM drive, a sound board, middling-quality speakers, and a microphone; these systems range in price from just under \$2,000 to just over \$3,000 with a monitor. We examined AT&T and IBM's voice mail-equipped, high-end notebook computers. These portables, which include audio chips and minimal speakers, will run from \$3,000 to more than \$7,000.

The desktop telephony-equipped systems should be judged on more than just their voice mail features. We found the AT&T Globalyst 362 TPC to have the most inviting and intuitive interface. The AT&T model also includes a microphone built in to one of the two external speakers. The Compaq Presario 774 CDS was the least robust of the bunch. But the Presario's Multimedia Monitor with attached car-like speakers and built-in microphone makes setup a breeze and saves desk space as well.

AST

AST's Advantage! computers are bundled and priced for home use but

abound with business telephony features. AST's own Teleworks telephony package has up to 99 voice mailboxes, Caller ID support, message notification via pager or cellular phone, fax forwarding, and integration with Lotus Organizer for schedule, address, and to-do list information.

Teleworks also includes a full-duplex speakerphone and a 14.4-Kbps fax modem.

A representative AST system, the AST Advantage! Adventure 6075, lists for \$2,399; it includes a 75-MHz Pentium CPU, 8MB of RAM, 128K external cache, a 514MB hard disk, a quad-speed CD-ROM drive, speakers, a microphone, a 15-inch monitor, and a long list of software titles. With a setup poster and

instructional videos on the hard disk, the AST is easy to install and comes set for home or business use. (AST Research Inc., Irvine, CA; 800-876-4278; 714-727-4141; fax, 800-926-1278.)

AT&T

It's probably not a surprise that AT&T—a computer company and a telephone company—is looking to take a leading role in computer-based telephony, both on the desktop and on the road.

AT&T's original Globalyst 360 TPC system is being joined by six more telephony-equipped desktop models with voice- and fax-message management. AT&T uses Syncro Development Corp.'s Multimedia Connect (renamed

the Personal Communications Center) in its desktop Globalyst computers that are intended for serious work-at-home users and small-business offices. The Syncro software, reviewed in the main story, includes multiple mailboxes, Caller ID support, full-duplex speakerphone support, and pager message notification.

One unit, the AT&T Globalyst 362 TPC, has an expected selling price of \$1,799 with a 75-MHz Pentium CPU, 8MB of RAM, 256K cache, a 540MB hard disk, a quad-speed CD-ROM drive, 1MB of VRAM, a 14.4/19.2-Kbps data/fax modem and audio board, speakers, a microphone, and software—but no monitor.

AT&T's two new notebooks, the Globalyst 200S and 250P, will have built-in speakers and microphones and will be upgradable with voice modems to act as simple answering machines. The notebooks will have Delrina's WinFax Lite with Voice Mail but will not come with standard modems. The 200S, a DX4/75-based unit, is expected to sell for about \$2,999 with a 10.4-inch dual-scan color screen, 4MB of RAM, and a 340MB hard disk. The higher-end 250P will have a 75-MHz Pentium CPU, 8MB of RAM, a 540MB hard disk, 10.5-inch active-matrix color screen and an expected price of \$5,699. The AT&T voice modem for the portables will sell for between \$400 and \$500. (AT&T Global Information Solutions, Dayton, OH; 800-442-1124; 513-445-5000.)

COMPAQ

Compaq Computer Corp.'s wide range of Presario computers includes multimedia systems that combine voice mail with ease of use through component integration and Compaq's TabWorks Windows interface, which can replace Program Manager. The voice mail and fax software is also Compaq's.

The \$2,099 Compaq Presario CDS



774 comes with a 75-MHz Pentium processor, 8MB of RAM, a 690MB hard disk, a quad-speed CD-ROM drive, and a 14.4-Kbps fax modem. It's also paired with a \$399 14-inch Presario 140 Multimedia Monitor with stereo speakers, a microphone, and a head-phone jack. This is a fine platform for many uses including service as a message center for calls, faxes, and memos from other users.

The Presario's voice and fax features are suitable for basic home- or small-office use. With ten mailboxes, send and receive fax capability, a memo feature, and a shared address book for both fax and voice applications, the Compaq is a highly accessible one-step solution. (Compaq Computer Corp., Houston, TX; 800-345-1518, fax, 713-378-1442.)

IBM

IBM integrates voice mail into both desktop and portable computers. Its Aptiva value line of computers, which we did not receive in time to review, includes software for voice mail, fax, and e-mail. We did test one unit from IBM's potent portable line, which includes several models with full-duplex speakerphones and voice and fax mail management using IBM's Mwave DSP and Global Village Communication's FaxWorks Voice (reviewed in the main article of this feature).

IBM's professional portables are

beautiful but pricey high-powered systems packed with features. The IBM ThinkPad 755CE, which lists for \$5,599, has a DX4/100 CPU, 8MB of RAM, a 340MB hard disk, a 10.4-inch active-matrix color screen, a 14.4-Kbps voice modem, and an integrated speaker and microphone. Like the Aptiva desktops, the voice mail-equipped portables have a wake-up-on-ring feature to receive faxes or voice messages.

If you want to step up a level, consider the \$7,049 IBM ThinkPad 755CD. This unit adds stereo speakers, a double-speed CD ROM drive, enhanced video, a joystick port, MIDI support, MPC-II compliance, and a minimum 540MB hard disk. IBM's hot new ThinkPad 701 series, also known as the Butterfly, shares the voice and fax facilities of the 755CE/CD models. (IBM Personal Computer Co., Somers, NY; 800-772-2227.)

NEC

The NEC Ready 9510, from NEC Technologies, bundles FaxWorks Voice with a wide range of home-office software, including Microsoft Encarta, Microsoft Works, Printshop Deluxe, Quicken, and TurboTax. This

small tower system also is loaded with hardware, including a 90-MHz Pentium CPU, 16MB of RAM, a 1.2GB hard disk, a quad-speed CD-ROM drive, a 14.4-Kbps fax modem, a sound card,

speakers, and a microphone. This bundle has an estimated street price of \$2,699 without a monitor.

As implemented by NEC, FaxWorks Voice is a full-featured voice and fax messaging center with more than sufficient capability for small-office users. (NEC Technologies Inc., Boxborough, MA; 800-632-4636, 508-264-8000, fax, 508-264-8673.)

PACKARD BELL

Packard Bell's Multimedia Pentium line is another platform that uses FaxWorks Voice. Packard Bell sells two versions, one with a speakerphone and one without. The nonspeakerphone version we tested sells for \$2,000 and includes a 15-inch monitor, a 75-MHz Pentium CPU, 8MB of RAM, and a 812MB hard disk. The bundle also features a double-speed CD-ROM drive, a sound board, speakers that attach to the side of the monitor, and a 14.4-Kbps fax modem. You also get a long list of software including reference, entertainment, educational, and productivity titles.

All home- or small-office bundled computers have aids to simplify setup, but Packard Bell even color codes its cables and ports. With FaxWorks' plethora of high end features, including pager and Quick Fax message notification, the Packard Bell Multimedia Pentiums are quite suitable and aggressively priced for small- or home-office use. (Packard Bell Electronics Inc., Westlake Village, CA; 800-733-5858, 818-865-1555, fax, 801-579-0092.)

The integration of telephony into desktops and portables will likely become widespread within the next year. Vendors will follow the same path they did when adding multimedia: They'll have to offer it to keep up with everyone else. For the small office, these bundles with integrated voice mail and fax cost less than more complex, multiple-line solutions and save you the time and hassles of installation and configuration. □



Compaq Presario CDS 774



NEC Ready 9510

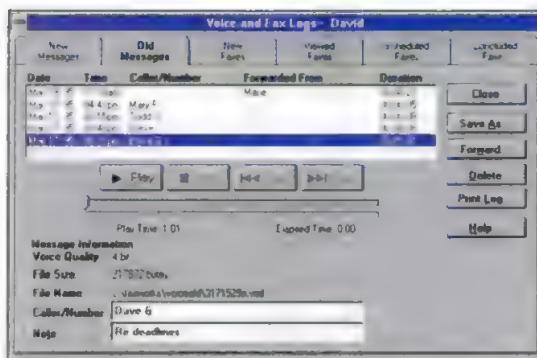


Packard Bell Multimedia

can forward messages or faxes to other mailboxes—a nice touch.

You can optionally set mailboxes to notify the mailbox owner (via pager, fax, or both) of each new voice message or fax. You can also set each mailbox to forward faxes to another number automatically.

FaxWorks can act as both a fax-on-demand and fax-back system, on a global and individual-mailbox level. For the whole system, you can specify up to 10 documents that a caller can request without a password and up to 1,000 items that need individual passwords. A doctor, for example, might give patients individual passwords to call for test results. You can also specify up to 10 items available in each mailbox only to those who know the mailbox password—useful for sharing confidential reports with colleagues.



Tabbed cards neatly separate FaxWorks' messaging categories; expanded message details appear on the bottom.

According to Global Village Communication, FaxWorks currently is bundled with internal modems from Boca Research, Computer Peripherals, Reveal, and Zoom Telephonics; we tested FaxWorks with the internal Zoom/Voice FaxModem VFP 14.4V. The package also ships with several

computers, including systems from Gateway 2000, IBM, and Packard Bell. (See "Voice Mail-Equipped PCs" for a look at the Packard Bell version.) Some FaxWorks versions include distinctive-ring support, full-duplex speakerphone support, and optional music on hold depending on whether the hardware supports these features. But regardless of version, the core program remains the same. FaxWorks offers enough features to make it hard to outgrow.

FaxWorks Voice 3.0. List price: With the Boca SDV14I Fax Modem with Voice, \$149; with the Zoom/Voice FaxModem VFX 14.4V, \$199. Global Village Communication Inc., 1144 E. Arques Ave., Sunnyvale, CA 94086; 800-736-4821, 408-523-1000; fax, 408-523-2407; e-mail, sales@globalvillage.com.

Circle 450 on reader service card

Telephone Meets Sound Card

By John R. Quain

Ultimately, the features of your telephony software—like speakerphone support—are determined by the hardware it runs on. And so a large part of the SOHO telephony boom is due to the introduction of multifunction expansion cards that not only juggle voice mail and fax functions but also include full sound board features as well.

Two multifunction boards that we really liked are the currently shipping OfficeF/X from Spectrum Signal Processing (800-667-0018) and the soon-to-be-released Phone Blaster from Creative Labs (800-998-5227). Each is a 16-bit ISA board that combines a 14.4-Kbps, V.32bis fax modem, sound card, and CD-ROM controller.

With all these components integrated onto a single card, multifunction boards are generally easier to install and less expensive than separate components. Multifunction boards come in two flavors: those that simply marry the discrete components of a fax modem and a sound board together on a single full-length card and those that

use a digital signal processor (DSP) to handle both tasks.

The former approach is taken by the SoundExpression 14.4VSp from Boca Research (407-997-6227) and Creative Labs' Phone Blaster. The SoundExpression uses a Crystal chip set to handle audio and a Cirrus Logic 14.4-Kbps fax modem chip set to manage telephony functions. SoundExpression has an on-board IDE CD-ROM controller and connections for a phone line, a microphone, stereo audio, external speakers, and a MIDI/joystick device. The TeleCommander 2500XL, a similar multifunction board from Diamond Multimedia Systems (800-468-5846), should be available by the time you read this.

The main advantage of the SoundExpression and other cards that use discrete components is that application-specific integrated circuits (ASICs) are still less expensive than DSPs. The SoundExpression, for example, has a list price of \$199—compared with \$299 to \$370 for packages that use DSP-based boards. But ASIC-based boards cannot be upgraded without adding or

changing chips. Boards that rely on DSPs can be upgraded through software to meet faster modem standards and new sound-compression schemes.

Some products use DSPs from Motorola and Analog Devices, but the most popular multifunction DSP on telephony/sound cards is IBM's Mwave. Two bundles that rely on the Mwave are Spectrum's \$349 OfficeF/X and Best Data Products' \$249 ACE 5000.

OfficeF/X is a particularly well-integrated package. It offers advanced features similar to the Phone Blaster but also includes a 32-voice wavetable MIDI synthesizer, which the Phone Blaster lacks. The Best Data ACE 5000 also uses an Mwave DSP, but it relies on a less-powerful version. Consequently, it does not yet support a full-duplex speakerphone.

Despite the elegance of using a single DSP for several tasks, boards based on separate ASICs have one distinct benefit: They can handle multiple tasks simultaneously without slowing down. Mwave-based boards, however, must sacrifice performance to manage concurrent tasks. □

Multi-Tech Systems Inc.

MultiExpressPCS

BY BRUCE BROWN

Although MultiExpressPCS 3.2 is intended as a communications center for a single user, it has some drawbacks in this capacity. The \$199 set of applications runs only on Multi-Tech PCS internal or external modems, doesn't support Caller ID or multiple users, and cannot act as a fax-on-demand system or voice bulletin board system (BBS).

SUITABILITY TO TASK

MultiExpressPCS

	Power	Ease
Answering/fax machine	Good	Good
Voice mail	Poor	Poor
Message retrieval	Fair	Good
Advanced fax features	N/A	N/A

But MultiExpressPCS includes a complete set of communications modules you can use by themselves or in conjunction with your own data-communications and fax software. Because MultiExpressPCS lets multiple applications share a single COM port, you can leave your computer unattended to receive data, fax, and voice messages.

We tested the program with the Multi-Tech MT2834PCS V.34 external modem (\$899, including MultiExpressPCS). The full set of MultiExpressPCS software includes MultiExpress for Windows, MultiExpress Fax, and Future Labs' TalkShow (a document-conferencing package). You can also buy the internal version of the modem, the Multi-Tech MT2834PCS/c V.34, for \$499 and purchase the \$199 software separately.

The voice mail application is adequate for one person, although it's pretty basic. You can use the default greeting or record your own with one of Multi-Tech's two high-compression voice-file formats—in low-quality (1.2K per second) or high-quality (2K per second) modes—using a telephone handset or headset. You can also use the voice editor to edit or combine message files, so you only keep what you want. But the program does not support some valuable features: It

does not allow remote call-in to retrieve messages, and faxes received by the fax application are kept in a separate log from voice messages.

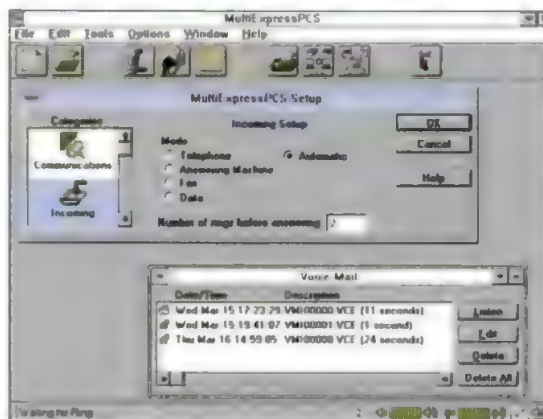
You must use the voice messaging and virtual-modem modules to make third-party communications applications work together. You can't receive multiple calls on one line, but you can have data, voice, fax, and document-conferencing applications share one system COM port.

Installation takes a while but isn't difficult. You just have to be sure to install the applications in the right sequence and configure port assignments and data paths correctly. The multiple cross-referenced manuals help, but a single manual for the whole bundle would be a better approach. The program's modularity, which allows third-party applications to work with and within MultiExpressPCS, is the reason installation is convoluted; a more cohesive installation process would be preferable.

New releases expected this year will include multiuser voice mail boxes, voice and fax transmission during the same call, fax-on-demand and fax-back, Caller ID support, scripting, and remote notification. The current version of MultiExpressPCS, though strong as an application-sharing communications tool, is somewhat limited as a voice mail system.

MultiExpressPCS 3.2. List price: \$199; with the Multi-Tech MT2834PCS V.34, \$899. Multi-Tech Systems Inc., 2205 Woodale Dr., Mounds View, MN 55112; 800-328-9717, 612-785-3500; fax, 612-785-9874; e-mail, multitech@winternet.com.

Circle 451 on reader service card



MultiExpressPCS includes basic messaging functions and can be set for one or all communications modes.

Syncro Development Corp.

Multimedia Connect

BY BRUCE BROWN

Currently available only bundled as an OEM product, Syncro Development Corp.'s Multimedia Connect 1.6.2 is well suited for home and small-office users. You won't find advanced fax features such as fax-back with Multimedia Connect, but the versatile messaging capabilities with added audio features make it a good choice.

We tested the software—renamed the Personal Communications Center—on a DSP-equipped AT&T Globalyst 362 TPC. (The program is used in all AT&T Globalyst TPC desktops; see the sidebar "Voice Mail-Equipped PCs" for other systems that include telephony.) Multimedia Connect, which can run on Mwave, Rockwell, and Sierra chip sets, is also licensed to AMI, IPC, and Media-Magic. Each version is designed for a specific chip set and audio board; when a common platform is established, Syncro

SUITABILITY TO TASK

Multimedia Connect

	Power	Ease
Answering/fax machine	Excellent	Excellent
Voice mail	Excellent	Excellent
Message retrieval	Good	Excellent
Advanced fax features	N/A	N/A

plans to sell Multimedia Connect as a standalone package at an expected street price of \$149.

The messaging software is bundled with Multimedia Blender, a sound editor and four-channel mixer that lets you record .WAV files or play audio CDs for music on hold. Multimedia Blender can monitor Multimedia Connect to turn down the music when the phone rings or when you make a call. The two programs are multitasking, so you can play a CD while listening to voice messages, for example.

Multimedia Connect's stylized interface depicts a speakerphone and answering machine. A scrollable list displays received messages and faxes, with the date, time, and duration of voice messages or number of fax pages. You click on the list to play a message or to view a fax. If you have Caller ID, the caller's number and name appear in a small screen when the phone rings. During a call, a caller can

Creative Labs' Phone Blaster: *Not Just Games*

By John R. Quain

Looking to repeat the pioneering success it has had in the sound card market, Creative Labs will be pushing a new product this year. Dubbed the Phone Blaster and expected to sell for about \$250 in stores, Creative Labs' latest offering is a hardware/software bundle that combines voice mail software with fax and modem functions and—best of all—a full-featured 16-bit sound card. Although the package wasn't shipping in time for this story, we evaluated a prerelease version of Phone Blaster to see if it may do for PC-based telephony what the Sound Blaster did for PC-based audio.

The full-length Phone Blaster ISA card is a multifunction board that offers SOHO users a single-slot multimedia and telephony solution. One comparable product available today is Spectrum Signal Processing's OfficeF/X (see the sidebar "Telephone Meets Sound Card.")

Creative Labs' own application-specific integration circuit (ASIC) can record and play back 16-bit, 44.1-KHz stereo audio and handle MIDI work using FM synthesis. An optional Wave Blaster II add-on daughter board will be available for wavetable synthesis. The telephony portion is governed by a Rockwell chip set for modem, fax, and voice functions. It offers a 14.4-Kbps fax modem plus a full-duplex speakerphone.

Connections include an on-board CD-ROM IDE controller and an internal analog audio hookup. All necessary peripherals can also be plugged into the board, including speakers, a microphone, a telephone line, and a MIDI/joystick device.

For telephony tasks, the Phone Blaster relies on Kalman Technologies' Ancilla. In its Phone Blaster incarnation, Ancilla employs a phone dial in its GUI from which you can dial out on the speakerphone, access a unified mailbox, or send faxes. Most telephony tyros will

find this design more convenient and comfortable to use than typical interfaces, which tend to use jumbled mailboxes as their centerpieces.

Ancilla includes nearly every voice feature imaginable for the Phone Blaster: up to 25 speed-dial numbers, 9,000 password-protected mailboxes, and an unlimited number of phone book entries. The unified mailbox holds voice messages, faxes, and files. With Radish Communications Systems' VoiceView protocol, Ancilla allows you to transfer data files to a compatible system while maintaining a regular voice conversation to the same number, one of the few features not currently found in OfficeF/X.

Typical voice mail features, such as Caller ID, distinctive ring, remote retrieval and access, and message forwarding, are also included. The most interesting feature is Phone Blaster's voice broadcasting, which lets you send a single recorded message to an entire group of numbers at a specified time. Anyone who answers the phone can reply directly to the message without having to redial your number; otherwise, the message is left on voice mail.

For peripatetic users, voice calls can be forwarded to another number or set up for voice or pager notification. And for corporate-sounding hold music, you can select a MIDI, .WAV, or audio-CD source.

Faxes are handled just as adroitly: They too can be forwarded to another number, or they can be viewed using a TIFF utility and passed to another mailbox. The 14.4-Kbps fax modem also includes full automated fax services. Both fax-back and fax-on-

demand are available, with up to ten documents assigned to each mailbox. Quick outgoing messages can be easily amended with your company logo and personal signature, or you can set up multiple recipients using the phone book for fax broadcasts.

The Phone Blaster does not currently include its own communications module to handle data transmissions. The latest version of WinCIM ships with Ancilla, and a launch utility

enables you to use any communications package.

The audio portion of the Phone Blaster fulfills most of the standard Sound Blaster functions. Its audio quality matches that of the company's top-of-the-line products in most

respects. The only disappointment is the fact that wavetable MIDI synthesis isn't included as standard. On the other hand, Creative Labs has done an excellent job revamping its sound utilities. Mixer tasks have been simplified, and the component stereo rack-style graphical interface has been joined by a unified remote control.

Overall, the Phone Blaster is a well-conceived, tidy package that combines the best features of telephony and sound. Its data-communications features could be much stronger, but the company has a solid start. As more multifunction peripherals hit the market, the question is whether Creative Labs' name recognition will keep the Phone Blaster from being lost in the shuffle. □

Phone Blaster. List price: \$299. Creative Labs Inc., 1901 McCarthy Blvd., Milpitas, CA 95035; 800-998-5227, 408-428-6600; fax, 408-428-6611.

Circle 467 on reader service card



With Ancilla, the Phone Blaster has nearly every voice feature imaginable, including an integrated mailbox and a sound mixer.

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Quality, Support
and Reliability

SUMMARY OF FEATURES

Telephony Software

■ YES ■ NO

Products listed in alphabetical order

	Cheyenne BitWare for Windows 3.24	ExpressFax+ 3.0a	FaxWorks Voice 3.0	MultiExpressPCS 3.2	Multimedia Connect 1.6.2	ObjIX Media Manager 1.03	QuickLink MessageCenter 2.0
List price (single-line system)	\$99.00	\$50.00	N/A*	\$199.00	N/A*	\$379.00	N/A*
General Features							
Single-user default greeting	■	■	■	■	■	■	■
Input source for greetings:							
Sound board microphone	■	■	■	■	■	■	■
Local phone	■	■	■	■	■	■	■
Remote phone	■	■	■	■	■	■	■
User can play back messages from:							
Sound board	■	■	■	■	■	■	■
Modem speaker	■	■	■	■	■	■	■
Local phone	■	■	■	■	■	■	■
Remote phone	■	■	■	■	■	■	■
User can customize greeting	■	■	■	■	■	■ (initial greeting only)	■
User can customize system messages via phone	■	■	■ ¹	■	■	■	■
Number of greetings per mailbox	Unlimited	None	1	Unlimited	Unlimited	3	Unlimited
Caller ID support	■	■	■	■	■	■	■
Displays number before user answers	■	N/A**	■	N/A**	■	N/A**	■
Looks up number and displays caller's name	■	N/A**	■	N/A**	■	N/A**	■
Multiple phone-line support	■	■	■	■	■	■	■
Automatic message notification via pager	■	■	■	■	■	■	■
Automatic message notification via fax	■	■	■	■	■	■	■
Automatic message notification via voice phone	■	■	■	■	■	■	■
Multiuser System Features							
Default messages for system navigation	■	■	■	■	■	■	■
Maximum number of mailboxes	1,000,001	10	1,005	N/A**	999	N/A**	10
Default greeting for all mailboxes	Optional	■	Optional	N/A**	■	N/A**	Optional
Individual mailbox greetings	■	■	■	N/A**	■	N/A**	■
Call-transfer support	■	■	■	N/A**	■	N/A**	■
Auto-attendant	■	■	■	N/A**	■	N/A**	■
Password protection for each mailbox	■	■	■	N/A**	■	N/A**	■
Communications Center Features							
Shares port with other communications software	■	■	■ (Windows version only)	■	■	■	■
Fax-capable	■	■	■	■	■	■	■
Data-capable	■	■	■ ¹	■	■	■	■
Distinctive-ring support	■	■	■	■	■	■	■ ¹
Auto-detects data/fax	■	■	■ ¹ ■ ¹	■	■	■	■
Remote fax-forwarding	■	■	■	■	■	■	■
Automatic fax-forwarding	■	■	■	■	■	■	■
Data file-forwarding	■	■	■	■	■	■	■
Fax-on-demand	■	■	■	■	■	■	■
Maximum number of documents available	Unlimited	N/A**	1,000	N/A**	N/A**	N/A**	99 per mailbox
Fax-back	■	■	■	■	■	■	■
Maximum number of documents available	Unlimited	N/A**	1,000	N/A**	N/A**	N/A**	N/A**
User can designate files for downloading	■	■	■	■	■	N/A**	■
Interactive voice response (IVR) system	■	■	■	■	■	■	■
Hardware Compatibility							
Chip set compatibility							
Cirrus Logic	■	■	■	■	■	■	■
Dialogic	■	■	■	■	■	■	■
Mwave	■	■	■	■	■	■	■
Rockwell International	■	■	■	■	■	■	■
Sierra Semiconductor	■	■	■	■	■	■	■
ZyXEL	■	■	■	■	■	■	■
Other	AT&T VCOS	None	None	Multi-Tech PCS	AT&T VCOS	None	AT&T VCOS
TAPI support	■	■	■	■	■	■	■

N/A* Not applicable. This OEM product is not sold separately. ¹ Versions designed for different chip sets may have this feature. N/A** Not applicable. The product does not have this feature.

SuperVoice 2.0a	VoiceFX 3.0
\$99.95	\$199.00
1	1
1,000	Unlimited
9 (public)	Unlimited
9	Unlimited
None	None

send a fax attached to a voice message. Using the software's full-duplex speakerphone mode, you can screen callers as they leave messages.

You can assign up to 999 password-protected mailboxes with one-, two-, or three-digit mailbox identifiers (so callers don't need to enter three digits if you have fewer than 100 mailboxes). With a Touch-tone phone, you can listen to messages and forward faxes and messages to other system mailboxes. Multimedia Connect can also notify mailbox owners remotely by fax when a voice message or fax comes in, but the program doesn't support pager notification.

Although data-file transfer is not supported, a button on the interface will launch a specified data-communications program, which can share the COM port with the other applications. Like all of the products we reviewed (except VoiceFX), the program cannot work as an IVR system.

Version 2.0 of Multimedia Connect, due in June 1995, will include data-file transfer and management, pager notification, fax-back and fax-on-demand, and an integrated link to Internet e-mail. If you don't require a fax-response system or pager notification, however, the current version of Multimedia Connect has an easily accessible voice mail and fax system with convenient audio features.

Multimedia Connect 1.6.2. List price: With the MediaMagic Telemetry-32, \$299. Syncro Development Corp., 840 Town Center Dr., Langhorne, PA 19047; 800-741-0370, 215-741-0300; fax, 215-741-3230; e-mail, market@syncro.com.

Circle 452 on reader service card



Don't adjust your screen: Multimedia Connect's GUI mimics an answering machine and sound mixer with three-dimensional exactitude.

ObjIX Multimedia Corp.

ObjIX Media Manager

BY BRUCE BROWN

A vanilla, single-user voice mail system, ObjIX Media Manager 1.03—previously sold as an OEM product to PC vendors—is now being sold directly to end users. More fully featured upgrades are imminent, but the version we looked at doesn't provide much more than you get from a \$60 answering machine. At \$379, Media Manager is only a good bet if you need an audio card along with voice mail.

Media Manager includes a half-length, 16-bit ISA card that functions as a modem

SUITABILITY TO TASK

ObjIX Media Manager

	Power	Ease
Answering/fax machine	Fair	Good
Voice mail	Poor	Poor
Message retrieval	Fair	Fair
Advanced fax features	N/A	N/A

and sound board as well as a clip-on microphone, cables for a Sony CD-ROM drive, and Windows-based software. In addition to a voice mail application, the Media Manager bundle includes a fax manager (which cannot be run concurrently with the voice mail program), Sound Blaster-compatible audio, a MIDI synthesizer, a CD-ROM interface, a dual-joystick game port, and a port for Plustek scanners.

Installation is quick and easy—the setup software determines your configuration and lets you choose from available COM ports and IRQs. About 13MB of hard disk space is required for the full complement of communications and multimedia software, the highest minimum requirement of any product we reviewed.

There's only one voice mailbox, with no second-tier message structure—another hindrance. You can override the default message with one of your own and record three different outgoing messages using an attached telephone or the included microphone. If you plug in speakers, you can use them as a speakerphone in concert with the standard microphone.

Media Manager stores received messages in a log, which records the time incoming calls

were received and the time and telephone number of outgoing calls. The log holds a maximum of 99 records but automatically saves overflow messages in a file on the hard disk. You can call in from a remote Touch-tone phone for messages, but you can't record a new outgoing greeting or delete messages remotely.

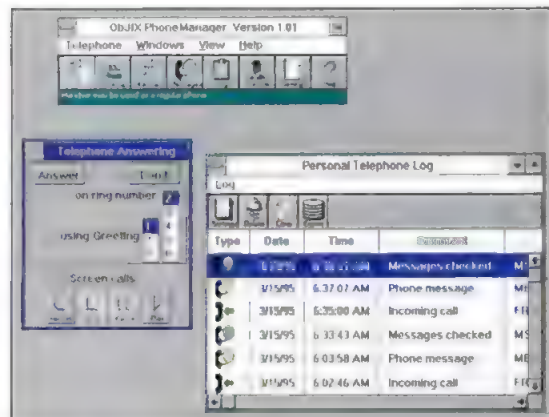
The fax manager is equally basic and functional. But you can't run the fax manager and the voice mail at the same time. A call discriminator determines whether incoming calls are voice or fax; if you set the program to act as an answering machine, it won't receive faxes—and vice versa. This limits its utility, especially for unattended operation.

A new version of Media Manager that will integrate voice and fax in a single mailbox and allow concurrent use is due by the time you read this and will be available at no charge to registered users. A multimailbox version due later this year, for which the upgrade price has not yet been set, will also add fax-on-demand, Caller ID support, and IVR.

Though easy and pleasant to use, the current version of ObjIX Media Manager has very limited voice mail that lacks integration with the program's fax features. The product is suitable only for single users who want its multimedia features, require simple voice mail, and don't mind switching software to send or receive faxes.

ObjIX Media Manager 1.03. List price: \$379. ObjIX Multimedia Corp., 332 Second Ave., Waltham, MA 02154; 800-854-6211, 617-466-8720; fax, 617-466-8722; e-mail, 76020.2453@compuserve.com.

Circle 453 on reader service card



Though easy to use, ObjIX Media Manager currently cannot receive both faxes and voice messages unattended.

Smith Micro Software Inc.

QuickLink MessageCenter

BY M. DAVID STONE

Nearly every kind of software feature related to modems shows up in QuickLink MessageCenter 2.0—from a terminal module for standard communications to a lightweight speed dialer with ten programmable buttons. Add to that voice mail and fax features and QuickLink serves as a highly capable voice mail system, an acceptable message center for storing and retrieving fax or voice messages, and a superb fax-on-demand system.

QuickLink, from Smith Micro Software, is available only as an OEM product. It is currently bundled with modems from Best Data Products and Smart Modular Technologies; according to the company, it will be bundled with additional modems by the time you read this review. For this story, Smith Micro supplied us with a version of QuickLink designed for the Rockwell chip set; we tested it on a Zoom/Voice FaxModem VFX 14.4V.

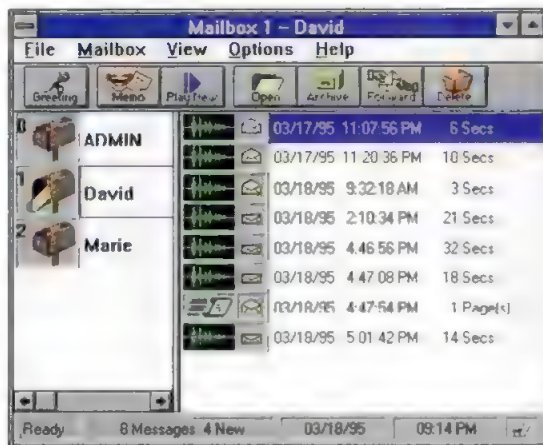
Setting up a fax system and voice mail for as many as ten mailboxes is as easy as you could hope for with QuickLink. Run the install program and you're ready. You can use the default greeting or record any number of new greetings. For multiple-mailbox systems, you'll want to give the full mailbox directory as part of the system greeting.

Other setup choices let you define a pager number for automatic message notification, turn the fax functions on or off, and enter a separate password for each mailbox. Also notable is support for call transfer, which can be quite useful if you're plugged into a phone switch that offers that feature.

The product's message-center capabilities are a little weak. The program offers a host mode for file transfer, for example, but when it's running, you can't receive voice or fax messages.

On the plus side, callers can send faxes to individual mailboxes. But mailbox owners can request faxes only on the current call, which means you have to dial from a fax machine or an equivalent software program rather than leave a number and have QuickLink call back.

QuickLink's fax-on-demand feature is among the best. The maximum of 99 fax documents per mailbox—up to the maximum of ten mailboxes—should be generous enough. Even better, QuickLink automatically generates a faxable list of



An icon next to each message in a QuickLink mailbox shows whether the message is voice or fax and if it's been read.

documents in each mailbox, which means you don't have to spend time and energy maintaining the list yourself. As with the fax-forwarding feature, however, QuickLink will send faxes only on the current call.

As you might expect for an OEM product, QuickLink comes in customized versions for different modems. Specifically, for hardware that allows a speakerphone

SUITABILITY TO TASK		
QuickLink MessageCenter		
	Power	Ease
Answering/fax machine	Good	Excellent
Voice mail	Good	Good
Message retrieval	Good	Good
Advanced fax features	Excellent	Excellent

feature—which at this writing means only the Best Data ACE 5000—QuickLink adds speakerphone capabilities, with additional controls in the QuickLink dialer. Some versions also support distinctive ring; however, you don't gain anything with this, since you still can't use the host mode, voice mail, and fax at the same time.

Regardless of version, QuickLink is



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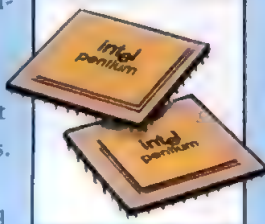
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COVER STORY

Telephony Software

SUITABILITY TO TASK

	SuperVoice	
	Power	Ease
Answering/fax machine	Good	Excellent
Voice mail	Good	Good
Message retrieval	Good	Good
Advanced fax features	Poor	Excellent

suitable or better than average for most purposes, especially if you need fax-on-demand.

QuickLink MessageCenter 2.0. List price: With the Best Data Products ACE 5000, \$249; with the Smart Modular Technologies ST1414L PCMCIA, \$219. Smith Micro Software Inc., 51 Columbia, Aliso Viejo, CA 92656; 800-964-7674, 714-362-2345 fax, 714-362-2300; e-mail, sales@smithmicro.com.

Circle 454 on reader service card

Pacific Image Communications Inc.

SuperVoice

BY M. DAVID STONE

If you want to set up a voice mail system with minimum fuss or customize a multibox voice- and fax-message center to taste, SuperVoice 2.0e may be your program of choice. The only significant weaknesses of this package are its fax-on-demand and fax-back features, which can best be described as token efforts. The rest of SuperVoice's features shine.

With a list price of \$99.95, SuperVoice 2.0e is available for all versions of Cirrus Logic, Rockwell, and ZyXEL chip sets. According to Pacific Image Communications, the different versions are nearly identical. The versions for the Rockwell and ZyXEL chip sets support Caller ID; all versions support distinctive ring for modems that

implement it. The Cirrus Logic version will also support those features for the new Cirrus Logic chip set, which should be available by the time you read this. We tested the program on an external Zoom/Voice FaxModem VFX 14.4V.

As with most other PC-based voice mail programs, SuperVoice can function as either a single- or multiple-mailbox system. And as with most, you have to record the mailbox directory as part of the system greeting. What makes SuperVoice different is a setup choice called Advanced Script.

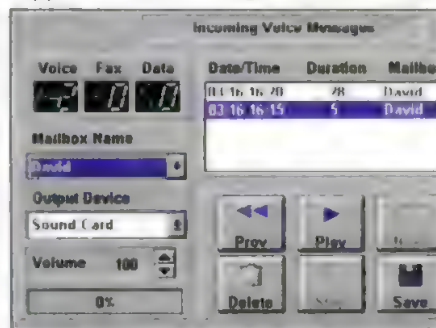
SuperVoice's Advanced Script lets you redefine the Touch-tone menus to enable or disable features or simply assign them to different Touch-tone numbers. Among the features you can assign (or disable) are the commands for starting data communication and sending a fax. The procedure is simple: To change the

*SuperVoice may be your
program of choice for
both simple voice mail
and advanced message-
center features.*

script, you don't have to write any programming code; you simply pick options from a drop-down list.

SuperVoice supports both distinctive ring and recognition of fax and data calling tones for modems that offer these features. But the caller also has the option of moving to a mailbox first and then sending a fax or data file to that mailbox. Mailbox owners can set SuperVoice to notify them by pager when they receive a message and can dial in to listen to messages and retrieve faxes (but not data files). Be aware that although you can set passwords for each mailbox, the security will not be complete. The system administrator has access to all messages, since they show up in the system administrator's mailbox as well as individual mailboxes.

SuperVoice currently is bundled with internal and external modems from nearly 30 manufacturers, including



To play or view a message in a SuperVoice mailbox, you can select the output device from a drop-down list.



**RIGHT NOW, THERE ARE HUNDREDS
OF VALUE DESKTOPS.
BY THE END OF THIS AD, THERE
WILL BE ONLY ONE.**

LET'S START BY SAYING THAT this is unashamedly an ad for the AST® Bravo MS. And the assumption we're making is that you're currently weighing the implications of moving over to one of the new 32-bit operating systems, like Windows®95.

On the surface of it, there are hundreds of desktops to choose from.

Obviously, they have to be Plug and Play ready to even be in the running. And, of course, they have to be affordable.

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But there's something else we haven't mentioned: AST NetFlash BIOS. It enables you to update all your Bravo MS desktops from a central location.

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Bravo MS

100MHz Pentium™ to
486 processors

4MB, 8MB or 16MB RAM,
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270MB, 540MB or 1GB Enhanced
IDE hard drive

PCI local bus graphics,
1MB graphics RAM upgradable to
2MB for 64-bit access

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7 expansion slots (2 PCI, 5 ISA)

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CIRCLE 234 ON READER SERVICE CARD

Is it Notes
with the power of five
desktop applications,
or is it five desktop
applications
with the power of Notes?



Then again, with
an R.O.I. of 189%,
who really cares?



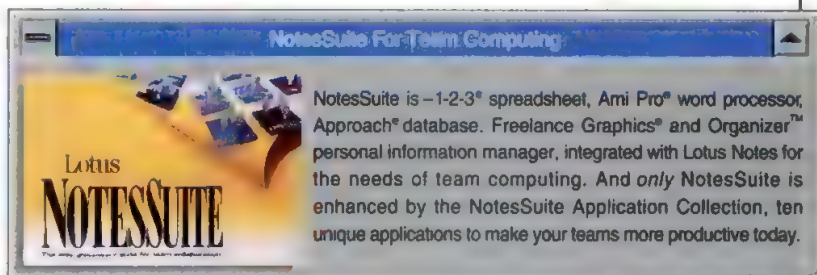
The introduction of Lotus® NotesSuite™ promises to make life a whole lot easier for anyone who is considering productivity software for their business. NotesSuite is the logical combination of two proven technologies: the desktop productivity tools of Lotus SmartSuite® connected to the groupware standard, Lotus Notes®. In fact, Notes is already delivering an average R.O.I.

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The Next Step Up: Beyond the Voice Modem

By M. David Stone

Before modems got into the act, low-end voice mail was based on special voice-processing telephony cards that offered a single port, meaning they could handle one telephone line. These days, cards with two ports or more take you to the realm of serious voice mail, whose denizens tend to refer to voice mail modems as toys. Products in this category are significantly more expensive than voice modems; \$600 to \$700 is a typical street price for a two-port board—often without software. But if you need a custom-designed application or have more telephone traffic than your voice mail package can handle, this is the category you should be looking at.

The dominant player in this market is Dialogic Corp. (800-755-4444, 201-993-3000), which claims up to 70 percent of the market and has boards with 2 to 30 ports. One measure of Dialogic's dominance is that other manufacturers, including Bicom (203-268-4484) and NewVoice (703-648-0585), claim to be Dialogic-compatible, which means they should be able to run software written for Dialogic boards.

One other manufacturer in this class is Rhetorex (408-370-0881), which claims the second-largest market share. Only Dialogic and Rhetorex have as many as 20 to 30 ports or more per card.

These boards can recognize telephone-network signals that modems can't. When you get a message that your call did not go through, for example, a special information tone (SIT) precedes it. Dialogic

boards can recognize SITs and pass the information to your software.

Another advantage is computing power. Even the two-port Dialogic boards, for example, offer a 20-MHz Motorola 56001—a more powerful DSP than you'll find in a DSP-based modem. What's more, the DSP handles only those functions it's best at,

such as recording and playback. Other chores are left to a control processor—an Intel 80C188 on low-end Dialogic boards or a 286 on high-end boards (386s are planned for future designs). All this hardware gives these boards plenty of computing power for applications that require

text-to-speech conversion or lots of ports.

Note too that you can add more than one card to a machine. You'll find this class of boards in turnkey packages that qualify as full-scale voice mail systems; they're often hidden in communications closets.

The drawback to these boards is that you'll either have to build your own software from a developer's toolkit or find a VAR or consultant to put a package together. Alternatively, you can try DemoSource (800-283-4759; fax, 602-922-5572) or Alliance Systems (800-977-1010; fax, 214-250-0921). Either will sell you a developer's toolkit or put together a package matched to your needs. A typical off-the-shelf low-end application designed for a two- to four-line home business will cost roughly \$500 for the software plus \$700 for a two-port board. Expect to pay another \$400 for a fax board and integrated fax software, for a total cost of about \$1,600. □

These voice-processing cards are ideal for sites that need custom-built applications.

Askey Computer Corp., CalCom Products, GVC Technologies, Logicode Technology, Zoom Telephonics, and ZyXEL; it also comes with several computers, including systems from Acer and Epson. None of the versions provide speakerphone support. Version 2.2, which should be available by the time you read this, will provide speakerphone support for modems that offer the feature, complete with full-duplex support if available.

Unless you need a strong fax-back or fax-on-demand capability, the more important issues will be the ease of setup and flexibility for customizing the system. On that score, SuperVoice does very well indeed. **SuperVoice 2.0e.** List price: \$99.95. Pacific Image Communications Inc., 919 S. Fremont Ave., #238, Alhambra, CA 91803; 818-457-8880; fax, 818-457-8881; e-mail, pacimage@aol.com.

Circle 455 on reader service card

Orion Telecom Inc.

VoiceFX

BY BRUCE BROWN



Though it requires a PC dedicated to voice mail and fax handling, Orion Telecom's VoiceFX 3.0 includes a lot of functionality in a relatively inexpensive system. Separate versions are available to handle one telephone line (\$199) through four lines (\$995). A robust DOS-based voice mail program that's as easy as most Windows applications to install and configure, VoiceFX is a good candidate if you're looking for high-performance voice mail and fax handling.

VoiceFX includes Rockwell DSP-based sound and telephony boards and requires a 386DX-based PC or better with 2MB of RAM and 10MB of hard disk space for two to four lines. (We tested it with one and two lines.) To set up the system, you install a separate internal board in a 16-bit ISA expansion slot for each line you want to connect. Most of the configuration and installation involves filling in on-screen forms, though some optional parameters can be entered in an ASCII file using a standard editor.

A system greeting, mailbox greeting,

COVER STORY
Telephony Software

and internal system messages come preinstalled with VoiceFX, but it's easy to use a telephone handset or microphone to record new initial greetings as well as system-navigation messages. You can set an unlimited number of mailboxes for each incoming line, each with customized greetings and instructions. During one call, callers can leave a message or fax, go to other mailboxes to leave messages or faxes, or even enter the fax-back or fax-

ward faxes to a specific number ahead of time. You can also configure it to notify you of messages via a pager, but it doesn't support fax or voice notification.

The current version doesn't support data, but a Windows version set to ship by the time you read this will integrate data communication; it will be added to the DOS version soon. Caller ID support is included along with a message-logging feature that captures caller information, including number and name. Because the program's forms-based scripts support recursive options, you can set up a complex IVR system for recorded information (VoiceFX is the only product we reviewed to offer this feature) as well as fax-back and fax-on-demand.

Because it requires a dedicated PC, VoiceFX can be more expensive to implement than the other products in this roundup. But the level of features it pro-

vides makes VoiceFX a good choice for a business with more than simple voice mail and fax-system needs. □

VoiceFX 3.0. List price: Single-line system, \$199; two-line system, \$497; three-line system, \$796; four-line system, \$995. Orion Telecom Inc., 1925 E. Beltline Rd., #405, Carrollton, TX 75006; 800-669-8088, 214-416-3720; fax, 214-416-4141; e-mail, 74647.1654@compuserve.com.

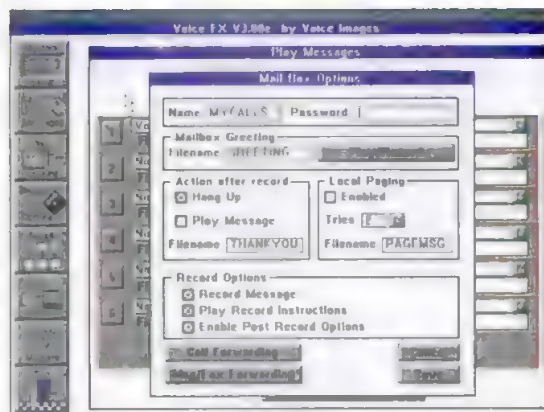
SUITABILITY TO TASK

VoiceFX

	Power	Ease
Answering/fax machine	Excellent	Excellent
Voice mail	Excellent	Excellent
Message retrieval	Excellent	Excellent
Advanced fax features	Excellent	Excellent

on-demand systems. If no mailbox is selected, fax and voice calls are automatically saved in a common mailbox.

From a telephone, you can retrieve, replay, and delete messages or change your greeting, but you cannot forward faxes remotely. You can, however, configure your personal fax mailbox to for-



VoiceFX's graphical and robust DOS interface makes configuration and message retrieval almost effortless.

What Would You Call A \$100 Digital Camera?



Video Magic.

QuickCam™ includes all you need to make movies and take pictures with your PC. Plug one cable into your parallel port, install the software and shoot. It's simple. Make training films, video conference, inventory valuables. It's easy to take pictures, too. Add photos to newsletters, documents, reports. QuickCam comes with Movie AVI for Windows, QuickMovie software, QuickFrame templates and QuickPicture image saver. All for around \$100. Your satisfaction is guaranteed. Buy your QuickCam today wherever fine computer products are sold.



System Requirements: A PC equipped with: 1 386, 486, Pentium or equivalent processor
• Windows 3.1 or 3.11, Windows for Workgroups 3.1 or 3.11 • 4 MB RAM required

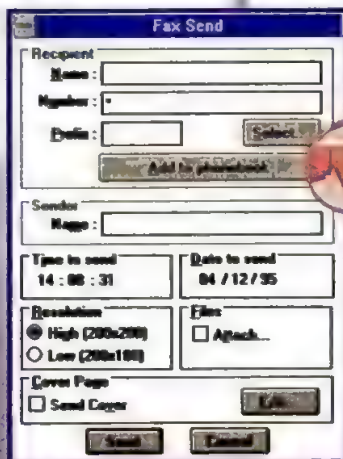









SWISS



The Relisys HomeScan Avec 140 works as a printer—if you print from Windows applications using the WinFax Lite CAS driver as the default printer and put an asterisk in the fax transmission sheet's phone-number field.

The Panasonic PFC KX-SP100 and Relisys HomeScan Avec 140 both require external telephones to send faxes from hard copy.



The Okidata Doc-it's front-panel controls don't resemble those on a fax machine or a printer. Looking for Form Feed? Try hitting Stop, then Enter, then Start.

HP provides a self-explanatory set of front-panel buttons for both fax and printer functions on its OfficeJet.

ARMY PRINTERS



Canon has added a high-quality speakerphone to its fax machine look-alike, and a clearly marked button to turn it on.

They print; they fax; they copy; they scan. But is the new breed of multifunction peripherals good enough at everything—or anything—to meet your needs?

By M. David Stone



ow that small office has emerged as a major market, manufacturers are tripping over themselves looking for ways to target it. One of the more intriguing results is the multifunction printer: a gadget that typically combines a printer, fax machine, copier, and sometimes more in a single package. The key advantage of such units is that they cut down on duplicate purchases. While a 4-page-per-minute laser printer and a separate plain-paper fax will run you \$1,000 or more, you can get a competitive multifunction printer for as little as \$765. Just as important, you have fewer machines to overwhelm your desk.

These two benefits fit in perfectly with the home office and truly small office, which almost by definition have limited space and usually limited funds. But the same advantages can pay off in a larger office as well. For example, a multifunction printer with fax may be the perfect choice for whoever receives and distributes faxes for the office, or for an executive who wants convenience printing, faxing, and copying close at hand.

► IN THIS REVIEW

<i>Brother Multi-Function Center 4500 ML</i>	179	<i>Relisys HomeScan Avec 140</i>	204
<i>Canon Faxphone B-170</i>	184	<i>Ricoh MV715</i>	204
<i>HP OfficeJet</i>	188	<i>Toshiba TF505</i>	205
<i>JetFax 4</i>	196	<i>Xerox 3002</i>	207
<i>Lanier 5010 MFD</i>	196	<i>Xerox 3004</i>	207
<i>Okidata Doc-It 4000</i>	199	<i>Xerox 3006</i>	207
<i>Panasonic PFC KX-SP100</i>	201	<i>Multifunction Others</i>	185
<i>QMS 2001 Knowledge System</i>	202	<i>Performance Tests</i>	192
		<i>Summary of Features</i>	200

Multifunction Printers

There are almost as many approaches to designing multifunction printers as there are companies to design them, which illustrates how unformed this category still is. Some units are clearly intended to be your main printer, with 4- to 8-ppm laser engines suitable for single users. Other units aim to keep the price within reach of home users by employing less expensive ink jet printing mechanisms.

Most of them fax, but not all; the QMS 2001 Knowledge System requires that you purchase a separate fax card. Most of them let you scan to your PC or offer an option for doing so, but the Canon, Lanier, Panasonic, Ricoh, and Toshiba units we tested do not. The Canon, Hewlett-Packard, Relisys, and Toshiba units offer convenience copying, limited to 200- by 200-dpi resolution, while others offer resolutions up to 400-by-400 dpi. Eight of the units offer fax-modem support so you can fax directly to and from your PC. Only the Canon Fax-Phone B-170 includes an answering machine. None of them offer color printing. You can even find multifunction devices that don't include printers but are combination scanners, copiers, and faxes (see the sidebar "Multifunction Others").

REVIEW CRITERIA

Since printing is the most important function for most PC users, to make it into this review a unit had to offer printing and at least two other functions. It also had to be aimed at the home office or small office (hence our \$6,000 base-price ceiling) and had to be shipping by late March. We found 14 products that fit these criteria.

Be aware that there were several products that arrived too late for testing or were not shipping in time for this review. Canon sells a Faxphone B160, which is similar to the B170 but without an answering machine. By the time you read this, the MultiPass 1000 should also be available; it will add scanning and faxing to and from the PC to the Canon repertoire. Also missing are the \$3,695 Konica 7310, the \$2,995 Konica 9715 (800-256-6422), and the \$4,650 Savin fax 3670 (203-967-5000) because the companies were unable to provide units for review. Lexmark International (800-358-5835) was putting the finishing touches on its Medley series of multifunction printers as we finished testing. These units are based around Lexmark's ExecJet 2C color ink jet printer, and they each offer a 14.4-Kbps fax, a 300-dpi monochrome scanner, a collating

copier, and three-color printing for under \$1,000.

THE MULTIFUNCTION BREAKDOWN

Almost all the units we saw leaned heavily toward one function—fax machine, printer, or copier—with additional functions grafted on.

Be sure the function you need the most is the one at which your chosen unit excels. Seven of the units we saw (from Brother, Lanier, Okidata, Panasonic, QMS, Ricoh, and Toshiba) offer laser or related engines, which make them suitable as your primary output device. Of the rest, most use slower ink jet technology. This can mean telltale bleeding at the edges of text characters and lines and banding on filled areas in graphics, but output is still acceptable for business use. The Relisys, however, uses thermal printing that is certainly inappropriate for business.)

The Panasonic PFC KX-SP100 is best understood as a laser printer with an added fax modem and scanner (strictly for faxing and photocopying). You won't, for example, find a dialing keypad, handset, or automatic dialer; in fact, you have to plug in a phone and dial manually to send faxes. Nor will you find such fax machine features as broadcast faxing.

Suitability to Task:
Multifunction Printers

The field of multifunction printers grew from a couple of lone pines to a forest seemingly overnight. And since there are no rules on how to build one, vendors are taking different approaches and including a variety of functions. We looked at the four common to most.

In **printing**, as in all four of these Suitability to Task categories, we gave equal weight to speed, output quality, and ease of use. We expected each printer to perform close to its claimed page-per-minute rating, and to maintain adequate speed when printing more difficult graphics samples. Text output was judged on crispness and darkness, while graphics needed to show good detail and no banding. Only laser-based machines managed a rating of *excellent*. Finally, we considered the range of features a unit offered, and how intuitive it was to access those features. Is the control panel familiar to printer users? Are there software utilities includ-

Product Name	
	SUITABILITY TO TASK
	Printing Poor
	Faxing Fair
	Copying Good
	Scanning Excellent
JACH ON TAP F	
v CEO Ms. Lana Clairmon	
m quotus arroget annus.	
N/A—Not applicable: The unit does not offer this function	

The graphics and text samples we present were produced by each unit in printer mode at the highest resolution supported.

ed that make it easier (or tougher) to use? All the units were fairly close in speed, so differences in the **faxing** rating reflect output quality and features. Better units were able to send and receive documents at 150 dpi or above, with a good range of grays for graphic images. Machines should offer speed-dial, quick-dial, and even group-fax capabili-

ties, and should be able to feed large multipage documents automatically. The ability to fax directly to and from your PC was a plus, and an intuitive control panel was a must.

With **copying**, again, speed was not the differentiating factor. We were eager to see quality approaching what people have come to expect from dedicated low-volume copiers. Units that received relatively low ratings here delivered merely convenience copies at less than 200-dpi resolution. Better machines produced good-looking text and graphics, and offered a range of extra features, such as multiple copies at the press of a button, and various paper-handling options.

To do well in **scanning**, a unit had to reproduce our black-and-white test photo quickly and faithfully. Is the resolution the machine offers good enough only for OCR, or can it render graphics images as well? How robust is the included Twain driver? Can you manipulate a scanned image? Here again, ease of use was important.

This printer-first design offers minimal fax capability at minimal cost—with a street price as low as \$765—and it's a good choice if you rarely need to fax hard copy to more than one person. Also in this category (but without a fax modem) is the \$1,649 QMS 2001 Knowledge System, which is a capable printer, an acceptable scanner, and a slow copier.

After printing, the most common function is faxing. And because fax machines can also copy, that adds copying as well. Interestingly, the majority of products on the market fall in the fax-based category. The HP OfficeJet, for example, offers both printer and fax front-panel controls. But the limitations of ink jet quality for professional output, combined with the full-scale fax features, make it much more of a fax machine than a printer. Other ink jet units include the Canon, the Relisys, and the Xerox 3000 series and the related JetFax4. They are generally good choices if you need a full-function fax machine and a light-duty printer.

The Ricoh MV715 and Lanier 5010 MFD show their office-copier heritage, as both offer high-quality, high-speed copying as their primary claim to fame. Both even look more like copiers than printers or fax machines, and both are targeted at the larger small office, with a street price of \$3,975 for the Lanier and a list price of \$5,995 for the Ricoh (no street price available). These copier-first units—particularly the Ricoh—are a potentially good choice for the larger small office that needs a hefty copier capability primarily, and the added convenience of printing and faxing.

We also saw two units that resist classification. The Okidata Doc-It 4000, with a street price of \$1,500 to \$1,600, is closer to a dumb printer than anything else, but offers a good mix of printing, faxing, copying, and scanning features (despite some flaws in the design). The Editors' Choice Brother Multi-Function Center 4500 ML, meanwhile, looks like a fax machine yet delivers sharp 6-ppm laser output for print jobs. It offers the most balanced set of features for an expected street price of \$1,000.

Our Contributors: BRUCE BROWN and M. DAVID STONE are contributing editors of *PC Magazine*. LEON ERLANGER was the editor in charge of this story, and MICHAEL J. ZULICH was the project leader.

• Brother Multi-Function Center 4500 ML

Not too long ago there was no market for multifunction printers. But the new SOHO inhabitants need printing, faxing, copying, and scanning capabilities in

tight spaces and on tight budgets.

It's important to note that while each of the machines we reviewed is markedly different, none were disappointments; all do a good job in delivering a variety of functions from one machine. When the dust settled at PC Magazine Labs, though, the only clear standout was the Brother Multi-Function Center 4500 ML (\$1,000 estimated street price). Targeted at individual users in either a home or office environment, the easy-to-use machine uses Brother's 6-ppm laser engine to deliver crisp 300-dpi output. Throughput speed was competitive on our printer and copy trials, though fax receiving was somewhat

slow. The Brother proved an excellent monochrome scanner—better than what we would expect at this price—and gives you extra conveniences such as a 30-page document feeder and the ability to fax to and from your PC.

Also in this class and worthy of an honorable mention is the Panasonic PFC KX-SP100. The Panasonic delivers good 4-ppm LED laser printing,

plus hard-copy fax and photocopying capabilities, for less than \$800. Most unique of all, the unit stands like a mini-tower; its 6.3- by 15.7-inch footprint should fit on even the most cramped desks. Some omissions and annoyances keep it a couple of strides behind the Brother, though (there is no scanning function, you have to hook up your phone in order to fax, and photocopying is slow).

There are other machines we looked at that are certainly worth considering, especially if you need more than a just a personal multifunction printer. The Lanier 5010 MFD is good for workgroup settings that require laser printing and robust copy-

ing, as well as the service that comes with purchasing a \$3,100 appliance. Xerox also delivers superior service for purchasers of its Xerox 3006 (\$1,795 list). The well-built unit offers a range of convenience features (including a 20-page document feeder and 100 speed-dial numbers), but you'll have to settle for ink jet-quality output instead of laser.



Putting everything in one box isn't the only way to get multiple functions. We were impressed by the HP ScanJet IIIc and Plustek ScanFX (see the sidebar "Multifunction Others"). These color scanners work with your existing printer and fax modem (assuming you have them) to add hard-copy fax and copying capabilities. This approach may work best if scanning is high on your list and you already own a printer, and it has the added advantage of letting you upgrade any part without throwing out the others. The drawback is that you have to leave your PC on if you want a 24-hour-a-day fax machine.

THE CAVEATS

As we mentioned, copying in many of these units is limited to the same low-resolution convenience copying as found in a standard fax machine. Scanning, when available at all, is often limited to a convenience level of 200-dpi fax resolution. And for the Relisys, printing itself is a mere convenience feature because of the thermal printhead. Most of the units did a good job of delivering quality output and respectable speed in their primary function. The abilities of additional convenience functions ranged from admirable to adequate to barely passable.

Another item to keep in mind is the multitasking abilities of these multifunction units. If you're printing and a fax

stare at a blank sheet of paper. a blank screen. and suddenly



you realize that Business school

wiped out everything

you learned in

7th

Grade

Art.

You were a painter, an illustrator, a construction paper genius
and you relished the opportunity to design something, create something.

Now you are a businessperson,
a businessperson

fidgeting and fretting over the thought of creating a
newsletter, a brochure, a flyer.

Business school and the business world convinced you that you are not creative.

Microsoft® Publisher is here to remind you that you are.

Publisher takes you through the process of laying out materials step-by-step.

Wizards help you select a style, set up the page, choose typefaces.

Import text from

Microsoft Word, WordPerfect®, Microsoft Works.

Publisher will wrap it around pictures, make it flow from one page to the next.

You can create a newsletter the first time you use the program.

Follow the templates it gives you. Answer the questions it asks you.

Let quick demos and design tips guide you as you select and place type.

If you make a grievous design error, the Layout Checker will let you know.

Instead of learning to use the software,
you learn to create publications.

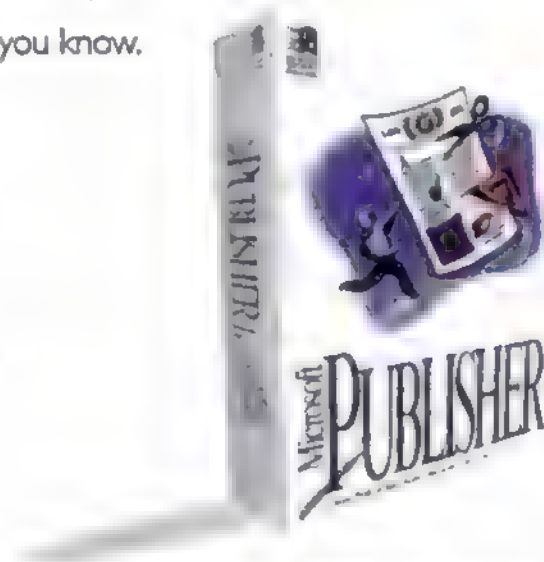
You learn to develop your own looks, follow your own gut,
and design with confidence.

Working hand-in-hand with Microsoft Publisher, you produce
brochures that look professional,

flyers that are impactful, materials that make
your company look big time.

You can do it. You've done it before.

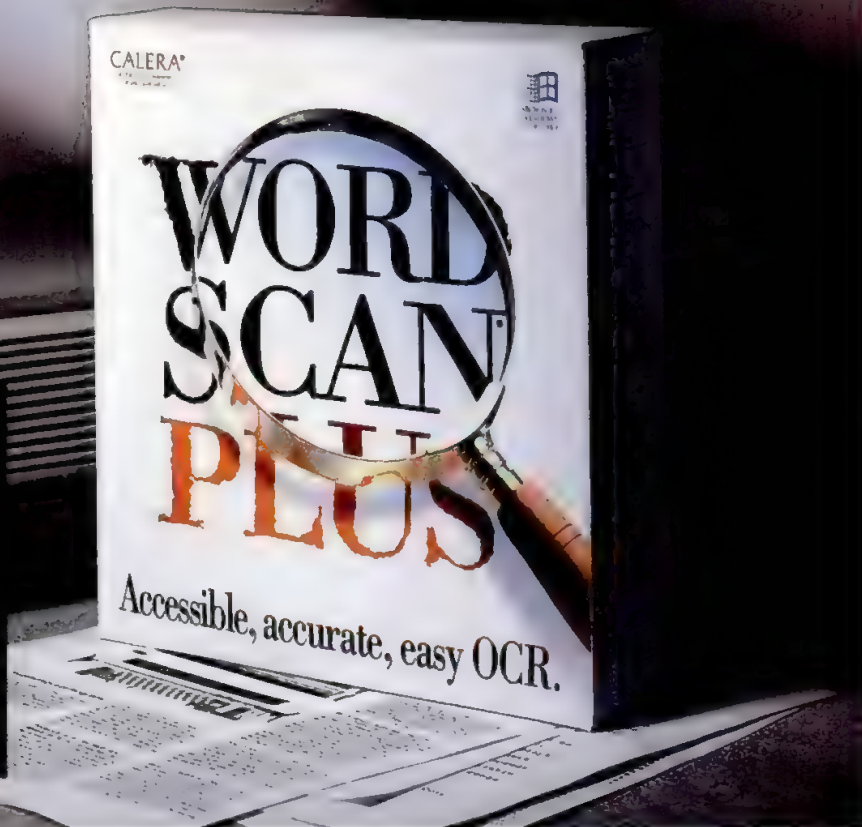
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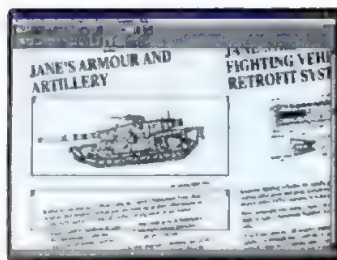
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CIRCLE 245 ON READER SERVICE CARD

Multifunction Printers

comes in, what happens to the two jobs? All except the Canon, QMS, and Relisys, successfully received a fax to memory after starting a print job, and accepted a print job while receiving a fax.

While the units generally offered straightforward setup, we did find some oddities. Okidata, for example, makes you install a control board in your PC to run the Doc-It, while the Brother and JetFax4 need both a serial cable and a parallel cable, which means you'll lose two ports.

Control panels, however, were all over the map. A few of the units offer reasonably well-designed front panels that made them relatively easy to use. The HP OfficeJet front panel, for example, offers a section for fax-machine controls and another for printer controls. The QMS was particularly noteworthy for providing easy-to-use software utilities that mimicked the traditional front panels.

Many, unfortunately, offer inelegant front panel designs that make it difficult to change settings easily. To give a form feed command to the Ricoh unit, for

example, you have to press the function key, then 37, then a right arrow to put the printer off-line, then a down arrow to print. The Doc-It's control panel is similarly obscure, but even more difficult to learn because it doesn't provide standard fax-machine or copier controls either.

Another concern is that if any part breaks down, you'll lose more than one function—and you'll lose all of them if you have to send the unit for repair. When it comes to warranties, the Xerox 3002 and 3004 win with a guarantee of overnight exchange if the unit fails within one year. If you pay for an extended contract, Lanier guarantees performance to your satisfaction or a replacement at no charge, 98 percent guaranteed uptime, a free loaner, and a 24-hour toll-free hotline.

Be forewarned that in most cases, some of the functions a device offers won't be up to the capabilities of separate standalone machines. Look carefully at the minimal functions in any given device and make sure they'll handle your needs.



Brother International Corp.

Brother Multi-Function Center 4500 ML

BY BRUCE BROWN



The Brother Multi-Function Center 4500 ML, with standout performance at an attractive price (\$1,995.95 list, \$1,000 street), is the best value in this roundup. Built around the Editors' Choice Brother HL-630 printer (*PC Magazine*, November 22,

HIGHLIGHTS

Multifunction Printers

The market for multifunction printers has sprouted seemingly overnight. Just two years ago there were only a couple units on the market; now most major office-equipment makers have an offering or will soon.

THE SEGMENT has exploded because so many more PC users are working at home, either toiling full-time or putting in extra time away from the office. Like most office workers, they need access to printing, faxing, copying, and sometimes even scanning capabilities. Unlike traditional workers in the corporate world, though, price and space-efficiency are key considerations. Enter the multifunction device, which delivers at least good enough output quality in a compact, affordable package. And while home-office users spring to mind as the primary target market, those in small offices or workgroups can reap the benefits of having a do-it-all output device within arm's reach.

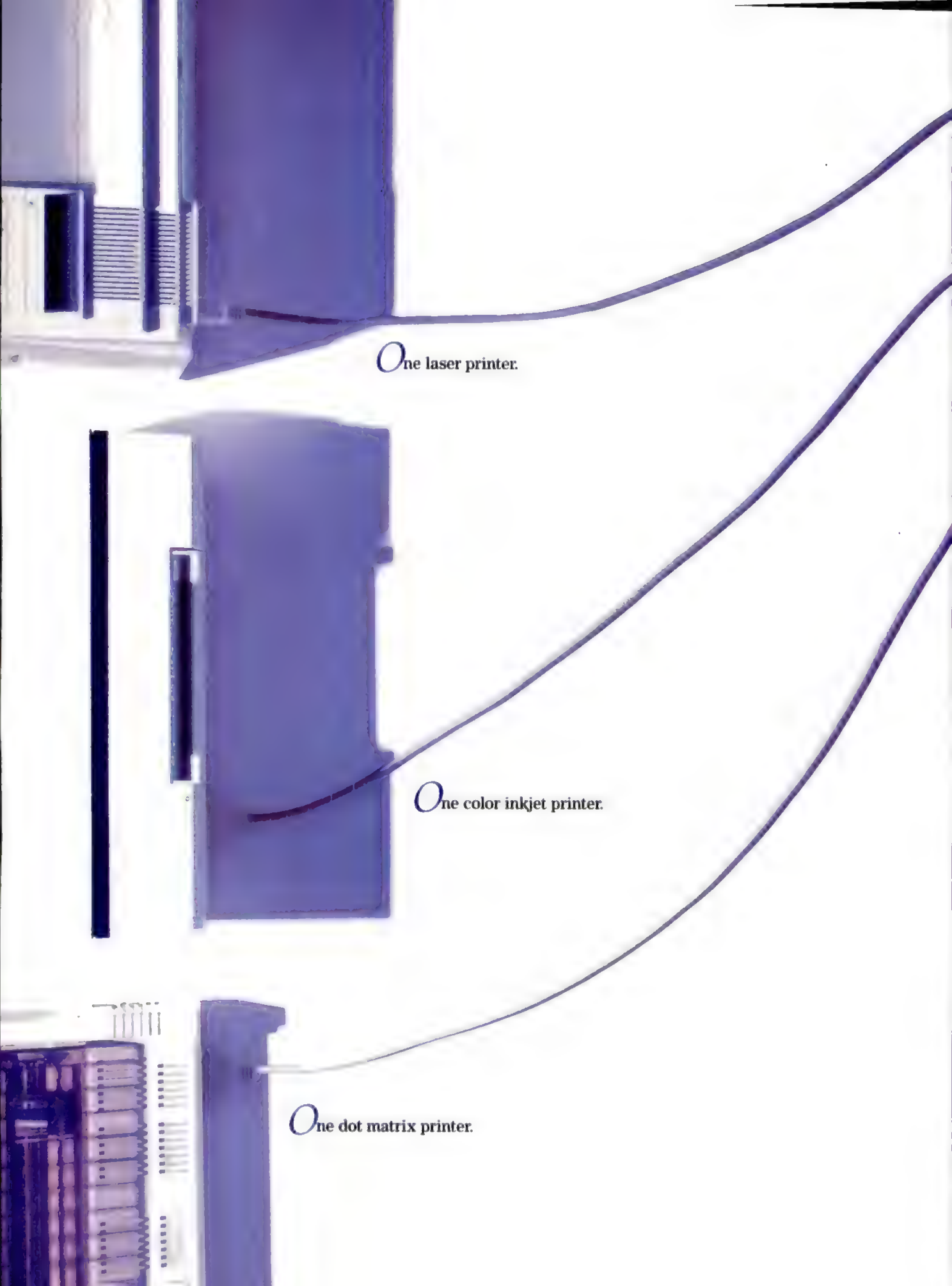
MANUFACTURERS ARE attacking the market from both the top down and the bottom up. Office-equipment makers Lanier and Ricoh, for example, have added multifunction capabilities to their light-duty photocopier engines to target small offices and corporate departments. Canon and Hewlett-Packard, meanwhile, have the home office and individual user in mind with their low-cost, ink jet-based offerings. Machines from JetFax, QMS, Toshiba, and Xerox fall somewhere in between.

CAST FROM DIFFERENT molds, multifunction peripherals excel at different tasks. Some are born of printers, others of fax machines, and still others of copiers. This means these jacks of all trades are often master of only one, and you'll need to be sure its best feature matches your primary need.

If you need superior printed output, for instance, you'll want to look at the

laser-based printers, since their output will generally be crisper and darker than that of an ink jet unit. If ink jet quality is good enough and you're primarily interested in a value-added fax, look for a machine that gives you convenience features such as speed-dial numbers, adequate memory in case paper runs out, and the ability to fax to and from your PC. If you need more than light-duty copying for a small office or workgroup, consider one of the more expensive copier-based offerings.

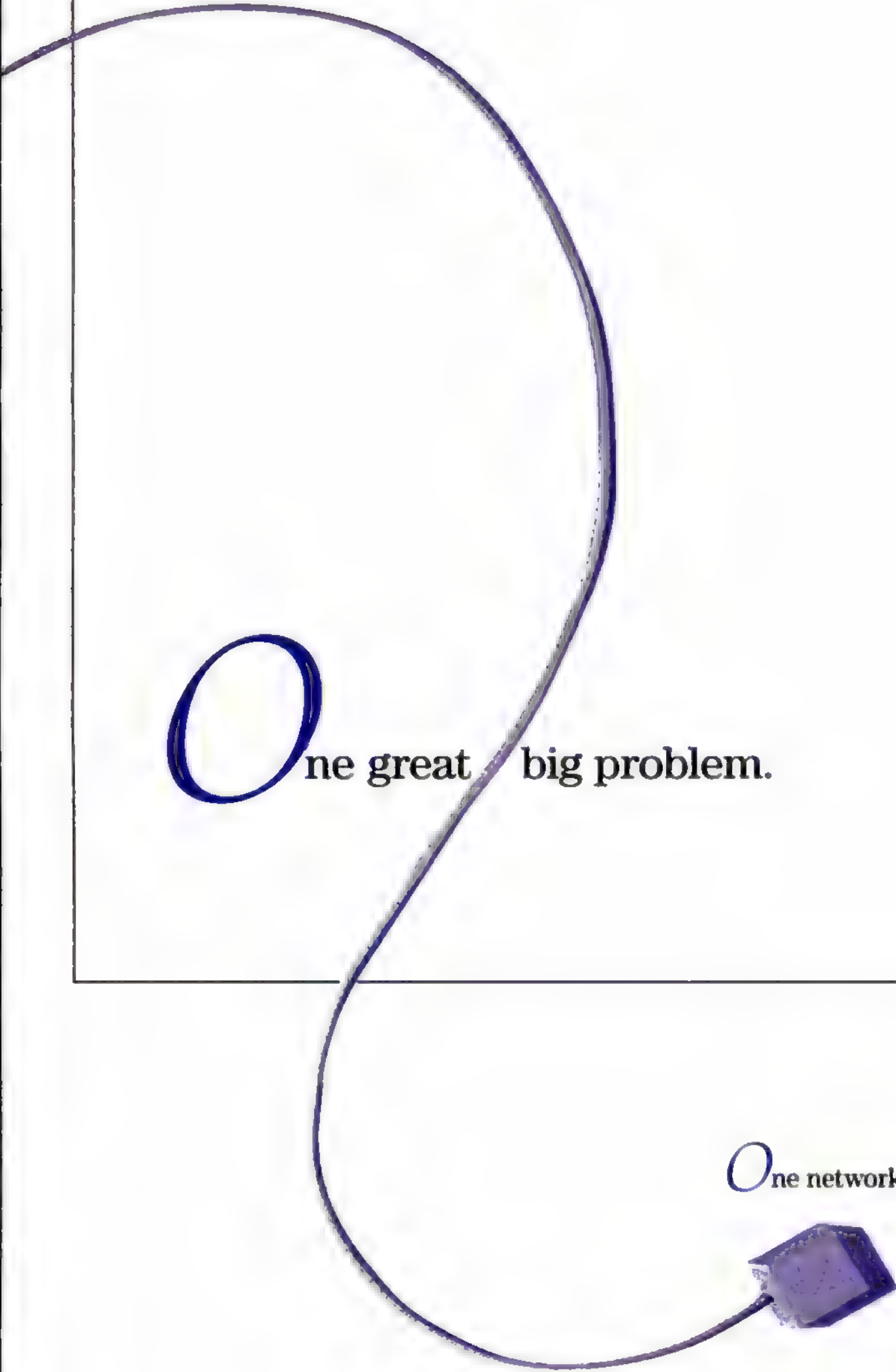
OTHER DETAILS to consider include a unit's multitasking capabilities. Most of the units we tested gracefully handled simultaneous jobs (such as printing when a fax came in), passing one job to memory and completing it when the first job was finished. Furthermore, a vendor's warranty and service plan are important, since this one machine will encompass so much of your personal productivity.



*O*ne laser printer.

*O*ne color inkjet printer.

*O*ne dot matrix printer.

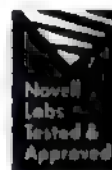


One great big problem.

One network node.

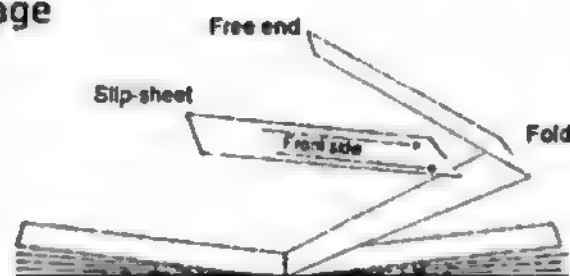


One network node.

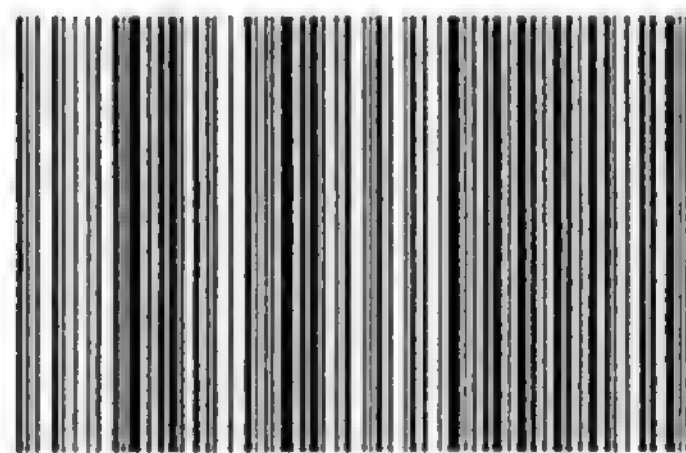


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1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



Foldout slip-sheet

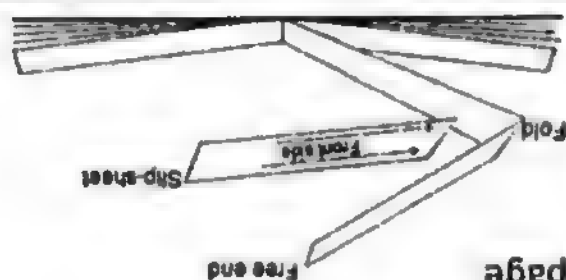


GbsSlipSheet-001

Inverted Foldout slip-sheet

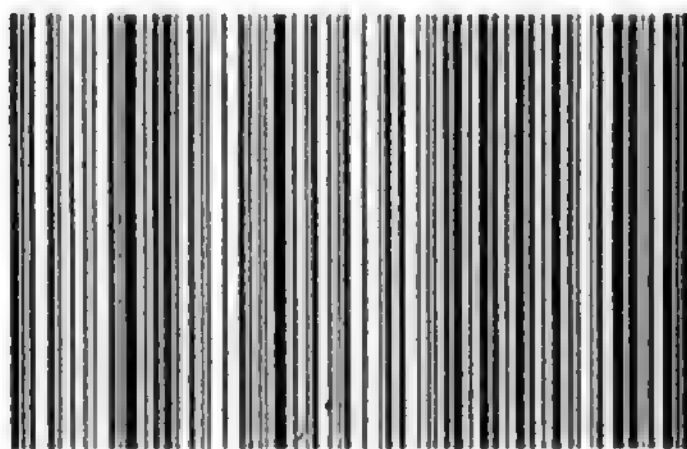
Folded edge of the page

1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



1. Follow instructions on the other side

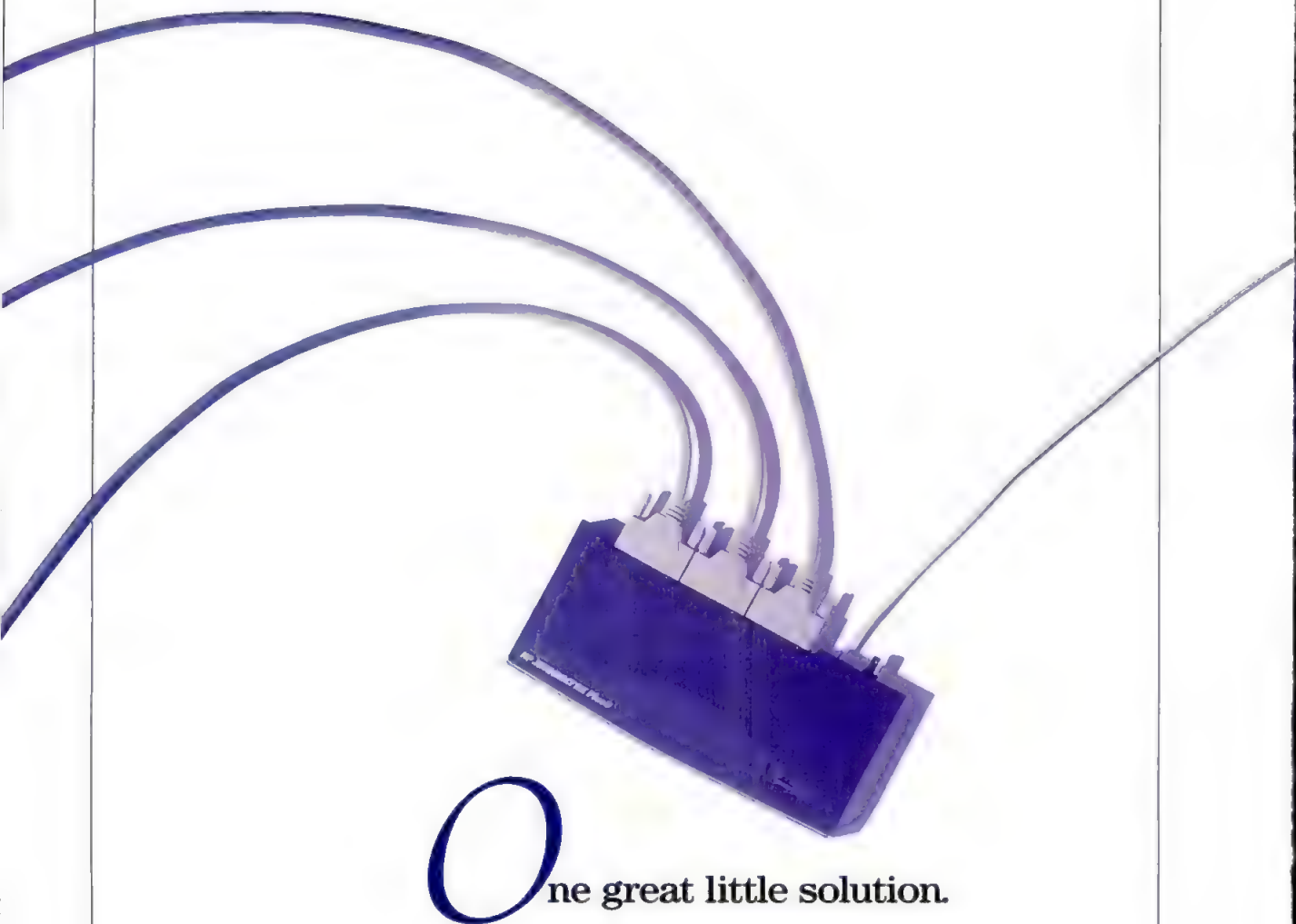
Inverted Back



Gbs5lipBack-0018

Back

1. Follow instructions on the other side



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COVER STORY
Multifunction Printers

1994), the Multi-Function Center combines four functions in one compact unit: a 300-dpi 6-ppm laser printer; a 400-by-400 dpi gray-scale scanner; a copier that reduces, enlarges, and collates; and a 9,600-bps fax. Brother calls the unit a five-in-one solution because it has both standalone fax and PC fax features. But however you count its features, the Multi-Function Center is ideal for home office users.

With a 14-inch-square footprint, the Multi-Function Center looks like a conventional fax machine, complete with a telephone handset on the left side. The unit has a 30-page automatic document feeder (for fax and copy documents) and a 200-sheet paper tray that output to separate trays in front. Setup is straightforward, with separate toner and drum units and two PC cables: one parallel and one serial (this setup is lamentably port-hungry, though). A bidirectional Windows printer driver and Brother's Missing Link

select only part of an original for scanning. But images showed excellent quality: 23 gray-scale levels and 200-dpi vertical and horizontal resolution make the Brother a good choice for scanning a wide variety of text, gray-scale images, and photos. Brother doesn't use a Twain driver, but saves scanned images in a proprietary compressed-file format that can be exported as .TIF or .PCX files. Copier resolution was similarly good. You can make up to 99 copies of an original, and the unit features reduction and enlargement at 8 fixed settings ranging from 50 percent to 150 percent.

Basic operations are intuitive to execute, with clearly marked (and thankfully few) buttons and controls. In addition to a telephone keypad and 12 quick-dial keys (24 with a shift button), there are 4 buttons each for printer and copier operations. The Missing Link software creates a Program Group in Windows icons for 11 utilities including fax in-box and out-box, address book, and one-touch speed-dial setup.

You can perform several operations simultaneously, including printing and copying, scanning and printing, and receiving or sending a fax while printing. The unit does offer a power-saving sleep mode (powering down to 13 watts), which you can configure to kick in after anywhere from 1 to 99 minutes of inactivity. Brother includes on-site service for the initial 90 days, and a one-year warranty on parts and labor.

With its space-saving design, good output quality, and a plethora of convenience features, the Brother Multi-Function Center MFC-4500ML is a great candidate for use in a one-person or home office. **Brother Multi-Function Center 4500 ML.** List price: \$1,999.95; 1MB printer-memory expansion, \$129.95; 1MB fax-memory expansion, \$189.95; toner cartridge, \$36.95; drum unit, \$189.95; Macintosh interface kit, \$89.95.

Brother International Corp., 200 Cottontail Lane, Somerset, NJ 08875-6714; 800-284-4357, 908-356-8800 ext. 7920; fax, 800-284-4329.

Circle 468 on reader service card



Canon U.S.A. Inc., Home Office Products Division

Canon Faxphone B-170

BY M. DAVID STONE

As the name implies, the Canon Faxphone B-170 is firstly a fax machine. But for \$1,695 list (\$900 to \$950 street) you also get a speakerphone, a digital answering machine (with the option to plug in an external answering machine instead), and a 360-dpi ink jet printer. And like any fax machine, the Faxphone can copy as well. You can't scan to or fax from your PC with the Faxphone as you can with other units reviewed here, and the inelegant incorporation of the printer may disappoint you. Still, home-office users looking for a fax machine and then some might like the Faxphone's unique mix.

If you're looking primarily for a printer, you should note that with the Faxphone the printer seems almost an afterthought. To print, you turn the printer on. To send a fax, you turn the printer off. And although you can print while receiving a fax to memory, you can't turn the printer on once the fax starts printing. On the plus side, you will find controls on the front panel for line feed, form feed, and setting the printer on-line.

Installation is trivial, consisting of little more than plugging the unit in, loading an ink jet cartridge, and loading paper in the 100-sheet paper cassette. The Faxphone emulates both an Epson LQ printer and Canon's own BJ-10, which is compatible with the

Brother Multi-Function Center 4500 ML



SUITABILITY TO TASK	
Printing	Excellent
Faxing	Excellent
Copying	Excellent
Scanning	Excellent

OUCH ON TAP F
v CEO Ms. Lana Clairmont
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MFC software for PC faxing and scanning control round out the package, and they installed without a hitch.

Perhaps the most notable aspect of the Multi-Function Center is the laser printer. It delivers the fine-print quality characteristic of a 300-dpi laser, with clear, crisp text and well-detailed gray-scale graphics. The 6-ppm engine was among the fastest in this review on our DOS- and Windows-application tests.

On our tests, fax transmission took a quick 1 minute 8 seconds for 1 complex page, and the resultant output was exceptionally clear. Receiving the same page, however, took a long 2 minutes 26 seconds. Convenience features abound, with 24 one-touch and 100 speed-dial numbers, automatic page reduction from legal- to letter-size, 20-page fax memory, fax forwarding, remote fax access, and pager notification.

Scanning time was a long 4 minutes 12 seconds; there is no way to prescan and

Canon Faxphone B-170



SUITABILITY TO TASK	
Printing	Good
Faxing	Good
Copying	Fair
Scanning	N/A

OUCH ON TAP F
v CEO Ms. Lana Clairmont
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■ Multifunction Others

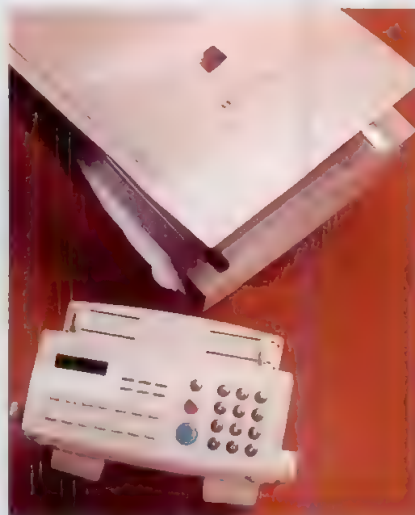
By Bruce Brown

Not all multifunction peripheral devices are based on printers. Several devices are now available that actually start out as desktop scanners. Such a unit, plus the bundled interface cables and software packages, lets you use the fax modem and printer you already own to add copier features and hard-copy fax-transmission functions to your computer system. The allure of such "multifunction scanners" is clear: Since most computer users already own a printer, there's no use buying a whole new printer (a pricey little component) just to get the extra utility and convenience of a multifunction unit.

Multifunction scanners work by using their image-capture mechanisms to take a picture of whatever is placed on the scanning surface; the image is then passed to the software. The software uses your present printer (a Windows-supported ink jet or laser printer is required) to produce copies of the scanned image; thus you have a copier. If you also have a standard fax modem, the interface software passes the image to it, so you can fax from your PC what was originally hard-copy output.

Multifunction scanners aren't necessarily the best way to go unless scanning is an integral part of your computing. You still have to provide a printer and a fax modem and deal with their separate interfaces, drivers, and quality. If you already have a good printer and a fax modem, however, multifunction scanners can round out your computer's paper input and output capabilities.

The two machines we received in time for testing—the Hewlett-Packard ScanJet 3c and Plustek ScanFx—represent the high-end and value side of scanner-based multifunction peripherals. Mustek, Plustek USA, and UMAX Technologies were among the vendors with upcoming models that couldn't make the testing deadline for this story. Even fax software vendor Delrina was



The HP ScanJet 3c and Plustek ScanFx.

showing a bundled hardware/software solution, the WinFax Scanner, which should sell for as little as \$299.

HEWLETT-PACKARD SCANJET 3C

Hewlett-Packard (800-722-6538, 208-396-2551) has staked out the high ground with its new HP ScanJet 3c (\$1,179 list, \$999 street). This color desktop scanner boasts 600-dpi optical resolution, 30-bit color depth, and 1,024 gray-scale levels. The full-size flatbed scanner (4.5 by 14.5 by 23 inches) comes with HP's ScanJet Copy utility. The bundle includes a SCSI interface card; cable; SCSI DeskScan II 2.2, Twain driver; Calera WordScan 3.1 OCR software; and Corel's PhotoPaint 5.0.

The ScanJet 3c looks like and is a conventional flatbed scanner; its multifunction capabilities come solely from the ScanJet Copy utility. When you load the utility, a graphic that resembles a copier control panel appears, with Windows radio buttons for choosing a copy mode (text, photo, or mixed), the number of copies, enlargement or reduction settings (25 to 999 percent), copy quality (quick, normal, or best), and darkness. There's also a big copy button and a printer-setup control.

The ScanJet is a capable scanner. We measured 600-dpi resolution in line-art mode and 33 gray-scale steps in photo mode, though scanning was on the slow side (2 minutes 13 seconds). This scanner makes a terrific copier when paired with a good laser printer. Monochrome-only users on a tighter budget could consider HP's ScanJet 3p (\$499 street), a 300-dpi monochrome scanner that comes with the same ScanJet Copy software.

PLUSTEK SCANFX

Plustek (800-685-8088, 408-745-7111) offers the compact and affordable ScanFx (\$799 list, \$499 street). The color unit delivers 300-dpi by 600-dpi optical resolution (interpolated to 1,200 dpi) and 24-bit color scanning in a 9.5-inch by 5.3-inch footprint. The included ten-page sheet feeder and software turn your printer (ink jet or laser) and fax modem into a copier and hard-copy fax machine. The ScanFx comes with a proprietary interface board and cable; bundled software includes Picture Publisher LE, a Windows Twain driver that includes color and black-and-white prescanning, Calera WordScan 3.0 OCR software, and One Touch Key—an application that lets you program 14 fax quick-dial keys.

Unlike the HP unit, the ScanFx control panel looks like it came from a standalone fax machine, with a telephone dial pad, 14 quick-dial keys, mode and resolution buttons, LCD status screen, and big buttons marked Fax, Copy/Print, and Stop/Eject. It took the ScanFx only 20 seconds to scan the test photo, with impressive image quality and very fine resolution. At 4 minutes 21 seconds, faxing was slow. Resolution was on a par with other multifunction devices we looked at: 80 dpi by 100 dpi. Copier output (150- by 150-dpi resolution in photo mode with 18 discernible levels of gray) shows the ScanFx is an able device in that function. □

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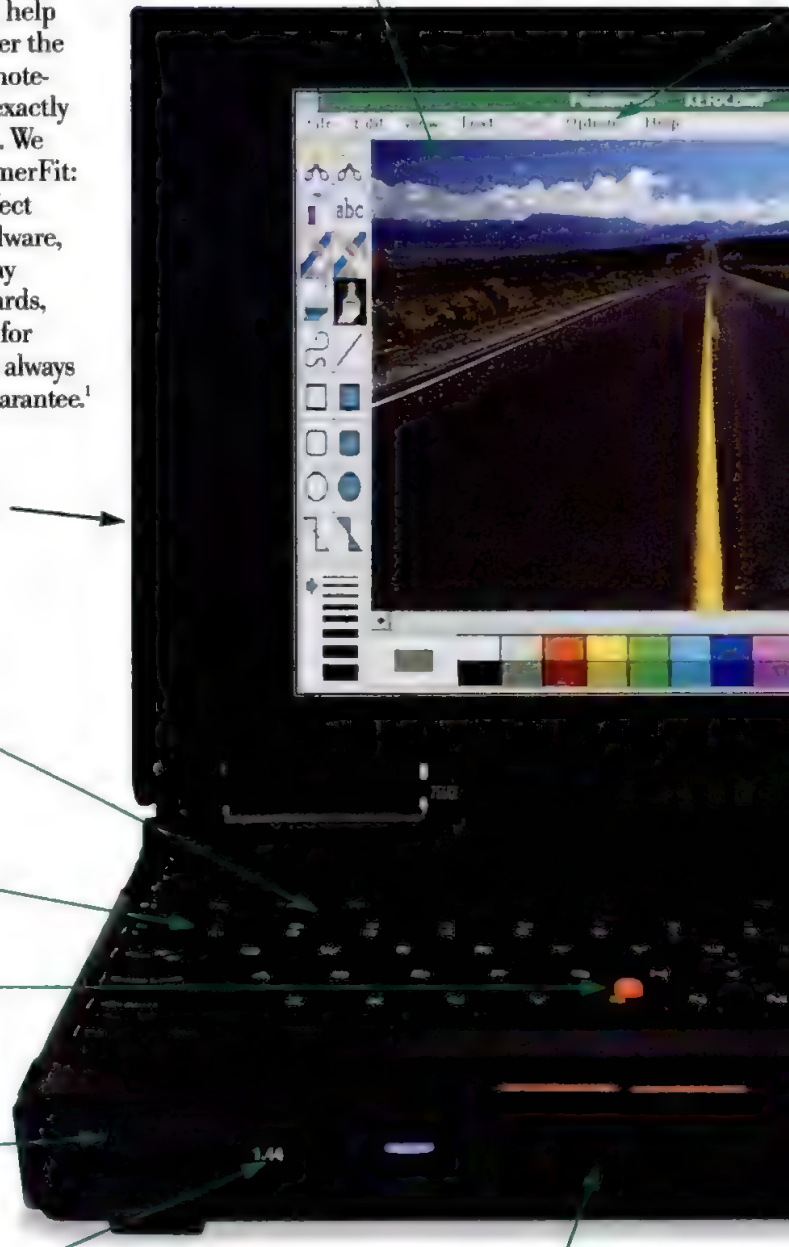
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Shown: the ThinkPad 755CE. Assembled in the U.S. and Japan.**

THINKPAD 755CSE	THINKPAD 755CE	THINKPAD 755CD
Dual scan color. Featuring the integrated Mwave Digital Signal Processor (DSP) with voice, fax and data capability	Black matrix on array TFT color. Featuring the integrated Mwave DSP with voice, fax and data capability	Black matrix on array TFT color. Featuring an internal, snap-out, double-speed CD-ROM, integrated multimedia and the integrated Mwave DSP
For more performance - Intel 486DX4/100MHz processor 8MB RAM (expandable to 40MB) 340MB¹ HD (upgradable to 810MB)	For more performance - Intel 486DX4/100MHz processor 8MB RAM (expandable to 40MB) 340MB¹ HD (upgradable to 810MB)	For more performance - Intel 486DX4/100MHz processor 8MB RAM (expandable to 40MB) 540MB¹ HD (upgradable to 810MB)
Better communications - Integrated Mwave DSP subsystem provides 14.4 data/fax modem - Mwave telephony includes telephone, full duplex speakerphone, answering machine - Full function audio support - Microphone/headphone jacks/integrated speaker - Infrared communications	Better communications - Integrated Mwave DSP subsystem provides 14.4 data/fax modem - Mwave telephony includes telephone, full duplex speakerphone, answering machine - Full function audio support - Microphone/headphone jacks/integrated speaker - Infrared communications	Better communications - Integrated DSP Mwave subsystem provides 14.4 data/fax modem - Mwave telephony includes telephone, full duplex speakerphone, answering machine - Full function audio support - Microphone/headphone jacks/stereo speakers - Infrared communications
Convenient to operate - Weights about 6.4 pounds* - Battery life approx.: 3.3-10 hrs.** - New TrackPoint III	Convenient to operate - Weights about 6.4 pounds* - Battery life approx.: 3.3-10 hrs.** - New TrackPoint III	Convenient to operate - Weights about 7.3 pounds* - Battery life approx.: 3-9 hrs.** - New TrackPoint III
\$4099 IBM Credit Lease \$144/month ²	\$4999 IBM Credit Lease \$176/month ²	\$6349 IBM Credit Lease \$223/month ²
STANDARD ON EVERY THINKPAD 755 NOTEBOOK		
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IBM Proprinter. We tested it in Pro-Printer mode and with its own driver for Windows. Output quality is average for 360-dpi ink jet printers: Edges are crisp enough for 10- and 12-point text, but not crisp enough for larger and smaller fonts. Photos and solid areas in graphics show obvious banding. At 1.9 ppm for text and 1.3 gppm (graphics pages per minute) for DOS graphics, speed is also on a par with other ink jets.

As a plain-paper fax machine, the Faxphone offers a full set of features, including the usual front-panel controls for dialing, sending, and copying, and an LCD-based menu for changing settings. It stores up to 66 speed-dial numbers, and if it runs out of paper or ink, it can hold up to 30 letter-size pages in memory. Both copier and fax machine offer a halftone mode for photos, as well as settings for blueprints and other special kinds of documents. But the feature is clumsy to use, since you have to toggle through the LCD-based menus to change the settings. Whether you use the built-in answering machine or an external one, the Faxphone automatically chooses whether receiving a fax or recording a voice message is appropriate. One more plus is that the half-duplex speakerphone offers reasonably good sound quality for a speakerphone. The digital answering machine sound quality, alas, leaves much to be desired. You may very well prefer to connect to an external answering machine instead.

The Faxphone B-170 packs plenty of functionality into one box. Consider it seriously if you need relatively little from your printer, and if your primary need is for a full-featured fax machine that's smart enough to share a single line with your phone and answering machine—and even be your phone and answering machine.

Canon Faxphone B-170. List price: \$1,695; ink cartridge, \$25. Canon USA Inc., Home Office Products Division, One Canon Plaza, Lake Success, NY 11042; 800-828-4040, 516-488-6700.

Circle 469 on reader service card



Hewlett-Packard Co.

HP OfficeJet

BY M. DAVID STONE

Think of the HP OfficeJet as an HP DeskJet520 printer with fax and copy capabilities and you won't be far off. The OfficeJet (\$860 list, \$699 street) has a 600-by-300 dpi ink jet printer with a claimed 1-ppm speed for highest quality mode, plain-paper fax, and 200-

dpi convenience copier. By the time you read this, HP will offer the OfficeJet LX (\$959 list, \$799 street), which adds a software bundle that gives you the ability to fax from and scan to your PC—with strictly convenience scanning at 200 dpi in photo or fine mode. You can upgrade from the OfficeJet by buying the software (and firmware upgrade for early OfficeJets) for \$119.

The OfficeJet sets up in minutes and is best suited to a one- or two-person office, or to serving double duty in a larger office as the personal printer for a designated fax recipient. A claimed power consumption of 10 watts at idle makes the machine inexpensive to run, but the output quality is limited by the ink jet technology. If you want a top-quality printer primarily with other functions as a bonus, one of the laser-based choices in this roundup will better suit you.

The OfficeJet's front panel has both fax-machine controls for faxing and copying and a set of printer controls and status lights. There's also an LCD-based menu for both fax and printer settings. The printer controls are highly welcome in a sea of fax-style front panels, and they

make the printer easier to use than packages that leave the printer controls out.

As a printer, the OfficeJet uses the same print engine and PCL 3 language as HP's DeskJet520 printer. Output quality is appropriate for an ink jet printer, making it suitable for 10- or 12-point text. But on the larger and smaller fonts typical of desktop-publishing output, limitations show up in the form of less-than-crisp edges on text. In our DTP tests, the printer also left telltale gaps in the photo, with razor-thin white lines between consecutive sweeps of the printhead across the page. Speed is typical for the technology, at 2.6 ppm on the text speed test, and 2.0 gppm on the graphics test. The printer, in short, is acceptable for minimal printing needs, but no more than that.

The OfficeJet fares better as a plain-paper fax machine, with such features as a 20-page automatic document feeder and speed dialing for 65 numbers. More important, the fax and printer features get along well together. If a fax call comes in while printing, the OfficeJet will answer and store up to 24 fax pages in memory, then print the fax when the print job is finished. Similarly, if you print from your PC while a fax is printing, the OfficeJet will accept the print job—or as much of it as will fit in memory—and print it when the fax finishes.

Copying is limited to 200 dpi and the ragged-edge lines you would expect from the resolution. Changing settings is somewhat clumsy, as you have to work your way through the LCD menu. But you'll find some welcome features, like the option to reduce copies to a choice of sizes.

The OfficeJet LX software, built around a customized version of Phoenix Technologies' Eclipse Fax, is notable for sending scan and fax data through the same parallel cable it uses for printing. Eclipse Fax is one of the better fax packages available, and is easy to use. Unfortunately, the Twain-compatible scanning was disappointing in our tests even by convenience-scanner standards. Scanning the photo took almost 3 minutes, and the image on-screen had so many horizontal gaps that it looked as if it had been painted on Venetian blinds. The printed image of the scan looked better, but with a visible dithering pattern. Hewlett-Packard says that it hasn't seen

HP OfficeJet

SUITABILITY TO TASK	
Printing	Good
Faxing	Good
Copying	Good
Scanning	N/A

ON TAP

CEO Ms. Lana Clairmont
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Performance Tests: Multifunction Printers

Most of the multifunction printers that we tested will prove adequate printers and fax machines, and some are laudable copiers and scanners, to boot.

What the Numbers Mean

The most well-rounded machines were the Brother Multifunction Center 4500 ML, QMS 2001 Knowledge System, and Ricoh MV715. It's no coincidence that these all employ laser-printing technology. The speed and quality improvement over ink jet competitors is marked.

Though fax speeds were similar, there was a lot of disparity in resolution. Five units (the Brother, Canon, Okidata, Ricoh, and Toshiba) approached the ideal 200- by 200-dpi threshold and would be good for faxing graphics or more detailed pages. The same holds true for the copy and scan functions: Resolutions at or above 200 dpi will yield satisfactory results for many types of documents, while lower resolutions will have you hunting for a better copier or scanner for important jobs.

For these tests we used a Hewlett-Packard Vectra XU 5/90C, a 90-MHz Pentium-based system with a 515MB hard disk and 16MB of RAM. Our software test-bed was MS-DOS 6.22 and Windows for Workgroups 3.11. The PM-189 test target was faxed to and from each unit using a Panafax UF-300. We tested each printer with the driver recommended by the manufacturer.

FAX SPEED AND RESOLUTION

The **Fax Speed** test shows the time required to send and then receive a full-page newsletter-style document with both text and graphics. **Fax Resolution** is measured using the industry-standard PM-189 test target.

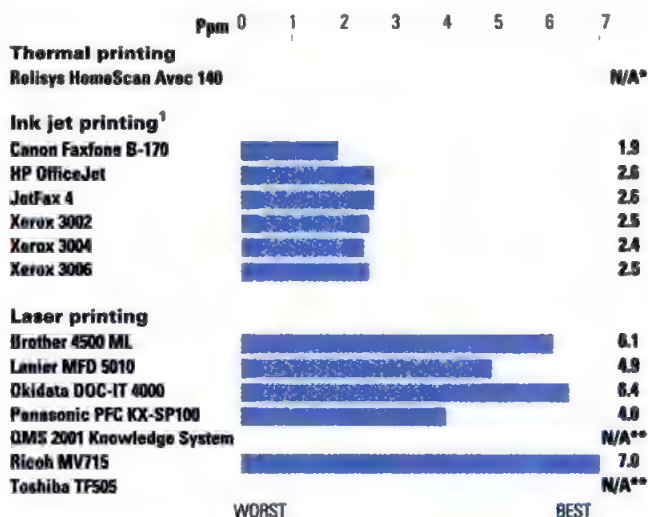
	Outgoing fax speed (min:sec)	Incoming fax speed (min:sec)	Outgoing fax resolution (lines per inch)	Incoming fax resolution (lines per inch)
Brother 4500 ML	1:08	2:26	150 x 200	150 x 90
Canon Faxphone B170	2:00	2:13	150 x 200	200 x 150
HP OfficeJet	1:31	1:29	150 x 150	150 x 200
JetFax 4	1:44	1:49	90 x 100	125 x 125
Lanier 5010 MPD	1:13	2:00	70 x 100	100 x 100
Okidata DOC-IT 4000	1:48	2:10	150 x 200	200 x 125
Panasonic PFC KX-SP100	1:32	1:25	75 x 80	150 x 150
QMS 2001 Knowledge System	N/A	N/A	N/A	N/A
Relisys HomeScan Avec 140	1:36	1:45	200 x 125	200 x 200
Ricoh MV715	1:36	1:51	150 x 200	125 x 200
Toshiba TF505	2:04	2:36	200 x 100	125 x 200
Xerox 3002	1:02	1:49	80 x 125	150 x 150
Xerox 3004	1:00	1:51	90 x 70	150 x 125
Xerox 3006	1:03	1:49	100 x 125	125 x 100

N/A: Not applicable. The device does not scan.

All the units turned in comparatively quick times when sending our newsletter page. Fax resolution was generally acceptable, given Group 3 specification of 203 dpi by 196 dpi. In send mode, the Panasonic had the overall poorest resolution of 75 by 80 dpi—okay for most text but poor for graphics. In receive mode, the QMS had the highest resolution: 200 by 200 dpi.

TEXT SPEED TEST

The **Text Speed** test measures the printer's speed in producing ten copies of a two-page business letter with 1-inch margins.



N/A*: Not applicable. DOS print jobs must be sent as fax documents.

N/A**: Not applicable. This is a HPI printer and therefore could not complete our DOS-based benchmark tests.

¹ We converted ink jet test results to pages per minute to facilitate comparison.

All the printers performed acceptably relative to their rated speeds. The laser and laser-like machines substantially outperformed their ink jet counterparts—by nearly 2 to 1. Oddly, the Relisys doesn't accept standard DOS print jobs but requires that files be sent to it as fax documents.

COPY SPEED AND RESOLUTION

The **Copy Speed** test shows the time required to photocopy a full-page newsletter-style document with text and graphics. **Copy Resolution** is measured using the industry-standard PM-189 test target.

	Time to copy image (min:sec)	Copy resolution (lines per inch)	Gray-scale steps
Brother 4500 ML	0:32	200 x 200	23
Canon Faxphone B170	1:13	200 x 200	10
HP OfficeJet	0:45	125 x 100	14
JetFax 4	0:32	200 x 200	19
Lanier 5010 MPD	0:10	150 x 100	9
Okidata DOC-IT 4000	0:15	200 x 200	18
Panasonic PFC KX-SP100	0:57	200 x 90	20
QMS 2001 Knowledge System	4:25	200 x 200	20
Relisys HomeScan Avec 140	0:25	200 x 125	4
Ricoh MV715	0:14	350 x 350	17
Toshiba TF505	0:47	150 x 90	14
Xerox 3002	0:32	200 x 200	17
Xerox 3004	0:32	150 x 200	17
Xerox 3006	0:31	150 x 150	17

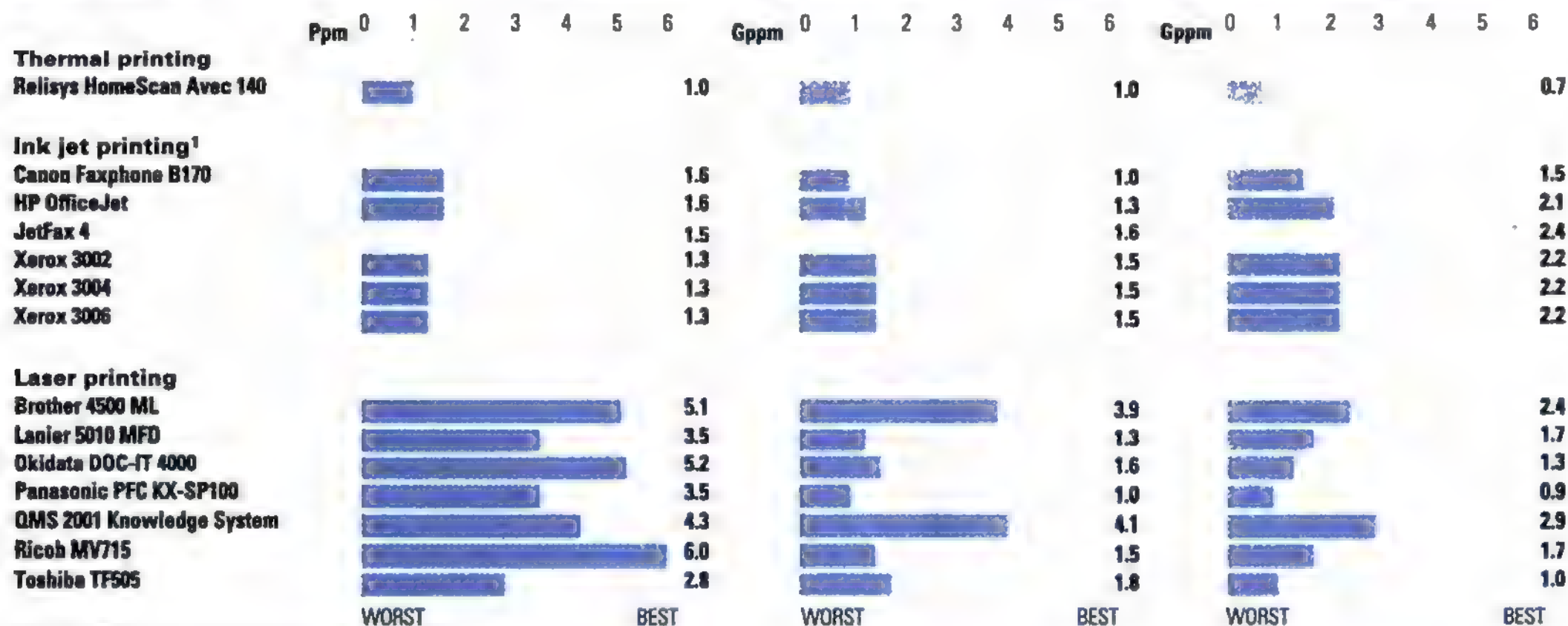
The QMS proved the slowest photocopier of the pack, taking a long 4 minutes 25 seconds to copy what most machines churned out in half a minute or less. The Lanier was the fastest. The Ricoh's measured resolution—350 lines per inch (lpi)—was remarkably high. Both the Panasonic and the Toshiba exhibited poor vertical resolution: a low 90 lpi.

WINDOWS PRINTING TEST

The **Word for Windows** test measures the printer's speed producing a ten-page report with multiple fonts and typesizes.

The **Lotus 1-2-3 for Windows** test measures the printer's speed producing a complex two-page spreadsheet with pie, bar, and line charts.

The **CorelDRAW!** test measures the printer's speed producing a one-page graphic with a TIFF image, horizontal and vertical gray scales, and line art.



When it came to graphics printing, the ink jet printers remained closely clustered in the range of 1.5 to 2.2 graphics pages per minute (gppm). Performance from most of the laser printers, however, began to drop off—sometimes dropping below the slower-rated ink jets. This could be caused by a number of factors, including how the printer

driver rasterizes an image, as well as the compression used.

The Relisys (a thermal printer) showed the poorest performance across the board; the QMS (a 6-ppm 600-dpi laser) had the best overall performance and output quality. Throughput from the Panasonic dropped off precipitously in Lotus and CorelDRAW.

SCAN SPEED AND RESOLUTION

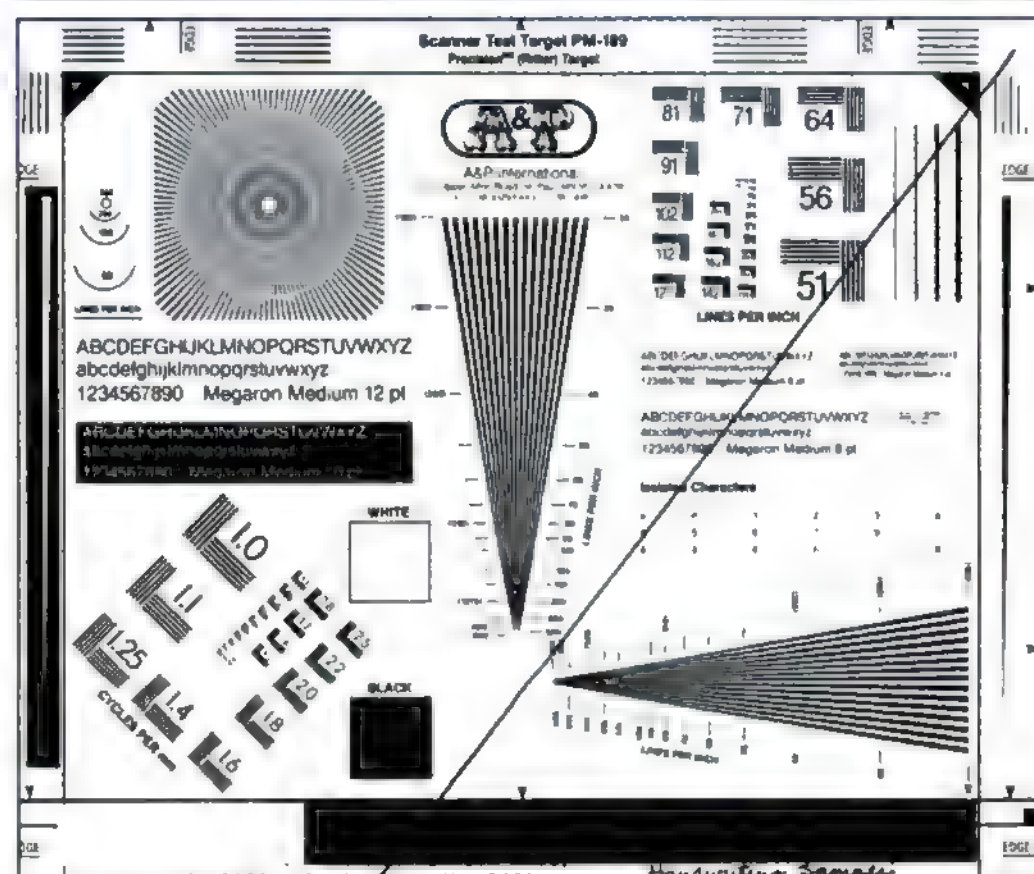
The **Scan Speed** test measures the time required to scan a 5- by 7-inch portion of a black-and-white photo. **Resolution** is measured using the PM-189 test target.

	Scan speed (gray-scale mode) (min:sec)	Scan resolution (lines per inch)	Gray-scale steps
Brother 4500 ML	4:12	200 x 200	23
Canon Faxphone B170	N/A*	N/A*	N/A*
HP OfficeJet	N/A*	N/A*	N/A*
JetFax 4	3:10	300 x 280	23
Lanier 5010 MPD	N/A*	N/A*	N/A*
Okidata DOC-IT 4000	N/A**	150 x 200	11
Panasonic PFC KX-SP100	N/A*	N/A*	N/A*
QMS 2001 Knowledge System	N/A**	400 x 400	16
Relisys HomeScan Avec 140	0:23	200 x 125	4
Ricoh MV715	N/A*	N/A*	N/A*
Toshiba TF505	N/A*	N/A*	N/A*
Xerox 3002	N/A*	N/A*	N/A*
Xerox 3004	15:26	300 x 250	30
Xerox 3006	N/A*	N/A*	N/A*

N/A* Not applicable: The device does not scan. N/A** Not applicable: The device could not feed heavy stock.

The Relisys required the least time to scan the photographic image (23 seconds), but that is entirely attributable to its lack of a gray-scale mode—it was able to produce only four shades of gray, and the result was unacceptable. The Brother and Xerox Twain drivers would not allow us to scan an area less than the entire 8- by 10-inch image, which hurt scan time.

TEST TARGET



We used this industry standard line-art test page (the PM-189 Scanner Test Target, from Century A&P) to determine the faxing, copying, and scanning resolutions of the multifunction units. The series of horizontal and vertical lines in the upper-right-hand corner indicates resolution; the bar along the bottom indicates the number of gray-scale steps.

how



machine

we

The machine is
nothing
but nuts, bolts and chips
until infused with
ideas,
thoughts,
notions,
that come to it
through a keyboard.

TALK

to

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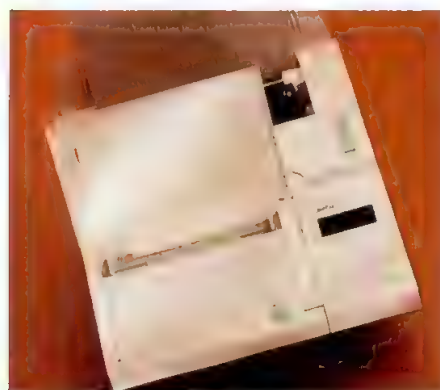
Multifunction Printers

these problems before, but wasn't able to tell us how to eliminate them. On the plus side, HP does give you a one-year overnight-exchange warranty.

Ultimately, the OfficeJet is a capable plain-paper fax machine, but not a stand-out printer—particularly when compared with the laser-based units in this overview. But for handy faxing, printing, and copying, OfficeJet will serve.

HP OfficeJet. List price: \$860; upgrade to LX, \$119. Hewlett-Packard Co., Direct Marketing Organization, P.O. Box 58059, MS511L-SJ, Santa Clara, CA 95051-8059; 800-752-0900.

Circle 470 on reader service card



JetFax Inc.

JetFax 4

BY BRUCE BROWN

JetFax's JetFax 4 bears more than a passing resemblance to the Xerox 3000 series of multifunction printers (reviewed elsewhere in this story), and it's not a coincidence. The JetFax 4 is manufactured by Xerox and shares the basic mechanical and electronic components, as well as a similar, though not identical, case. The base unit (\$1,795 list, with aggressive discounts from dealers) delivers 300-dpi ink jet printing and copying and a 14.4-Kbps fax. Our test unit came equipped with the \$299 PC Connectivity Kit that adds scanning and PC fax capabilities. If you need a versatile, do-everything convenience printer for a small office, the JetFax 4 is well suited to the purpose.

When you buy the PC Connectivity Kit you get Caere's PageKeeper scanning and document-management software, Delrina's WinFax Lite, and a Windows Twain driver. It also includes a small serial interface board that you

install in the printer (not your computer) and a serial cable. Installation is not noteworthy, though hooking the JetFax 4 to your computer with both a parallel cable (\$20) and the serial cable is unusual, and might make you wish for a more port-conservative design. The JetFax is even simpler to operate than its Xerox counterparts, with a four-line LCD menu (instead of the Xerox's two-line screen) and 20 fewer buttons on the control panel.

Print quality from the HP DeskJet 500-compatible unit was near laser quality, with a slight fuzziness of text characters and visible dots in 300-dpi graphics printing. No ink jet banding was visible in dense graphics printing of a scanned photograph. Fax resolution of both incoming and outgoing faxes was good, and the JetFax 4 offers a whopping (or ludicrous) 220 programmable quick-dial numbers. You can hook a telephone handset to the unit and also run an answering machine plugged into the JetFax 4; fax and voice calls will be directed to the proper device.

Copy quality and speed were very good. A copied photograph had some light banding, but resolution was high (a measured 200 dpi) and copy times of 32 seconds per page were competitive. The JetFax 4 churns out up to 99 copies of a single original and collates. It offers 50 to 200 percent reduction and enlargement. Because you don't need to add a card to your PC to use this 300-dpi monochrome scanner, the JetFax 4 would be suitable for those who use notebook computers as desktop replacements.

In addition to automatically reducing legal-size incoming faxes to letter-size paper, the JetFax 4 lets you simultaneously print, scan, and receive incoming faxes. Incoming faxes received while printing and print jobs started while a fax is printed are held in the standard 35-page memory, which is expandable to 140 pages with a 1.5MB expansion option (\$299).

JetFax 4



SUITABILITY TO TASK	
Printing	Good
Faxing	Excellent
Copying	Excellent
Scanning	Good

ON TAP F

new CEO Ms. L
a velim, chartis p

chrome scanner, the JetFax 4 is a reasonable choice.

JetFax 4. List price: \$1,795; PC Connectivity Kit, \$299; 1.5MB RAM upgrade, \$299; ink jet cartridge, \$54; drop tray, \$49; parallel cable, \$20; telephone handset, \$75. JetFax Inc., 1376 Willow Rd., Menlo Park, CA 94025. 800-753-8329, 415-324-0600; fax, 415-326-6003.

Circle 471 on reader service card



Lanier Worldwide Inc.

Lanier 5010 MFD

BY BRUCE BROWN

The Lanier 5010 MFD, a combination 10-ppm page printer, copier, and 9,600-bps fax machine, is further up the food chain from the OfficeJets of the world. At \$3,895 list (\$3,116 street), it's intended for small businesses and corporate workgroups where the high purchase price is offset by the vendor's initial and extended services and by the expectation that this unit will keep running for a long time. It isn't the device for you if you're looking for an inexpensive machine to equip a home office or a one-person start-up business. But if your small office needs a solid printer and better than convenience-quality copies, the Lanier is worth a look.

Unlike most of the machines in this review, the Lanier looks like a copier

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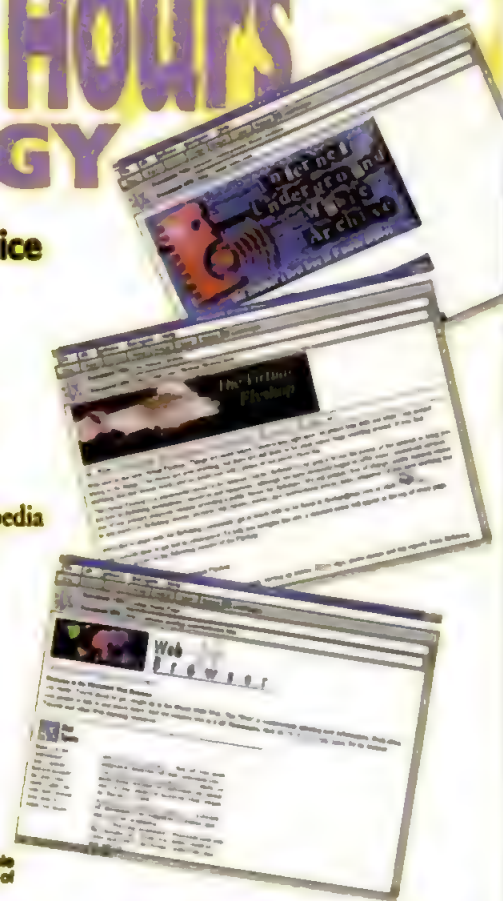
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Multifunction Printers

(measuring 12 by 26 by 17 inches) and is sold and serviced like one—through Lanier's sales force only. Initial setup of the machine couldn't be simpler: A technician comes to your place of business and installs it for you. No software is included, not even a printer driver (it can utilize the HP PCL drivers that ship with Windows).

The printer employs a Sanyo vacuum fluorescent-tube engine to produce up to 10 ppm (in copy mode) at 300-dpi. Output is crisp and dark, like most 300-dpi laser-printer output. There are front-panel controls for form feed, reset, and continue; an LCD readout gives DOS users access to 68 resident fonts. In fax mode, the unit's 100-dpi resolution meant good but not great quality. The Lanier offers a 30-page sheet feeder, 70 speed-dial numbers, 5 group-dial numbers, and 5 fax mailboxes. The Lanier can automatically reduce incoming faxes to 90 percent or 70 percent if necessary to fit one page, and the standard 12-page memory lets you receive faxes while printing or send a print job while a fax is coming in.

The Lanier really shines as a copier. It is both an analog copier (using a light-lens-mirror system to charge the whole surface of the drum, as in a standalone copier) and a digital one (digitizing a scanned image and transferring the image, in dots, to the drum). Analog copies took about 10 seconds each and were as good as a dedicated copier.

While the standard warranty (including on-site service) lasts only 90 days, a \$400-a-year extended-service contract includes on-site service, free loaners, and a 98 percent uptime guarantee with reimbursement for downtime. Lanier also guarantees support of this model with parts and service for 7 years, assuming the customer buys the extended service contract.

Too costly for home office installations and not fast enough for volume printing, the Lanier 5010 MFD is a likely candidate where durability and high levels of service are of paramount importance, and where

the primary need is for a good-quality copier and fax machine.

Lanier 5010 MFD. List price: \$3,895; 1MB fax memory, \$450; 500-sheet paper feeder, \$500; toner, \$41; developer, \$259; drum, \$259. Lanier Worldwide Inc., 2300 Park Lake Dr. NE, Atlanta, GA 30345; 800-708-7088.

Circle 472 on reader service card



Okidata

Okidata Doc-It 4000

BY M. DAVID STONE

There's an old joke that a camel is a horse designed by committee. Okidata's Doc-It 4000 (\$1,999 list, \$1,500 to \$1,600 street) could have been designed by that committee. Like a camel, the Doc-It offers some unique strengths along with some odd design features. And like a camel, it fits best in a special environment, which in the Doc-It's case is a relatively large small office.

The Doc-It has been around since 1992 (originally listing for almost \$4,000) and is considered the originator of the multifunction printer species. The Doc-It is built around a 400-dpi, 8-ppm LED engine, which gives it an advantage over much of the competition in speed and output quality. It also offers all the functions you're likely to be looking for: a plain-paper fax machine, a 400-dpi copier, and a 400-dpi

scanner with up to 64 gray levels. Extras include the ability to fax directly from your PC and the ability to remove the scanner from the unit and use it as a handheld scanner. Both scanning and fax control are built-

in to the Doc-It Manager software. The Doc-It driver lets you print or fax from any Windows program.

Then the committee went awry. The Doc-It is designed around a dumb-printer model: All the control electronics are on a card that goes in your computer. That means installing the Doc-It can be a bit of a headache, since you have to deal with potential IRQ conflicts and install software to use the card. It also means that you can't use any of the functions—including fax reception—unless your computer is on, too. This dumb-printer design makes the Doc-It a questionable choice in the smallest of small offices. Even if you're comfortable leaving your computer on 24 hours a day—through blackouts, brownouts, thunderstorms, and un-air-conditioned summer heat—the need for the computer to be on makes a mockery of the Energy Star symbol on the package unless you have an Energy Star PC as well.

If it won't bother you to leave a computer on full time, you'll find that the Doc-It is a capable beast, despite a front panel that is difficult to learn because it follows neither fax machine nor printer front-panel conventions. The front panel consists of little more than a numeric keypad, an LCD-

Okidata Doc-It 4000



SUITABILITY TO TASK	
Printing	Good
Faxing	Good
Copying	Good
Scanning	Good

JACH ON TAP F

new CEO Ms. La
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based menu, and four function buttons, and requires such cryptic codes as hitting Stop, then Enter, then Start for a form feed.

Output showed crisp, clean edges for all but the largest text fonts, and solid-areas in graphics filled in as solid black. The printer can use either PCL 5 (actually HP LaserJet III) or Microsoft's TrueImage, a PostScript clone, for its printer language. The Doc-It can store as many incoming fax pages as will fit on your hard disk. A nice touch for larger small offices is Okidata's Groupfax software (\$299), which turns the system that the Doc-It is attached to into a fax and print server for up to 25 client workstations. Copies, at 400 dpi, offer far higher resolu-

Lanier 5010 MFD



SUITABILITY TO TASK	
Printing	Excellent
Faxing	Good
Copying	Excellent
Scanning	N/A

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new CEO Ms. Lana Clairmon
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SUMMARY OF FEATURES

Multifunction Printers



■ YES □ NO

Products listed in alphabetical order

	Brother Multi-Function Center 4500 ML	Canon Faxphone B-170	HP OfficeJet	JetFax 4	Lanier 5010 MFD	Okidata Doc-it 4000	Panasonic PFC KX-SP100	QMS 2001 Knowledge System
List price (tested configuration)	\$1,999.95	\$1,695.00	\$860.00	\$2,094.00	\$3,895.00	\$1,999.00	\$999.00	\$1,649.00
Street price	\$1,000	\$900-\$950	\$699	N/A*	\$3,116	\$1,500-\$1,600	\$765-\$799	\$1,499
Parallel port/Serial port	■ ■	■ ■	■ ■	■ Optional	■ ■	■ ■	■ ■	■ ■
Dimensions (HWD, in inches)	11.7 x 17.6 x 17.8	6.4 x 17.3 x 13.1	11.1 x 17.3 x 15.5	6.1 x 16.4 x 19.4	12.3 x 18.9 x 20.9	8.5 x 17.8 x 16.4	13 x 6.3 x 15.7	10.6 x 21.8 x 21.7
Weight (pounds)	24	15	21	20	55	36	22	48
Wattage when printing/when in power-saving mode	480W, 13W	48W, 7.8W	35W, 10W	45W, 17W	500W, 17.5W	800W, 30W	32W, 18W	700W, 23W
Technical-support hours (eastern time)	9:00-8:00 M-F	9:00-6:00 M-F	10:00-9:00 M-T, Th-F; 10:00-7:00 Wed.	10:30-8:30 M-F	24 hours, 7 days	8:00-6:00 M-F	9:00-5:00 M-F	8:00-7:00 M-F
Warranty	90-day on-site service; 1 year parts and labor	1 year parts and labor	1 year overnight exchange	1 year parts and labor	90-day on-site service	90-day on-site service; 1 year parts and labor	1 year limited parts; 5 years on printhead	1 year parts and labor
Printing Features								
Type of printer	Laser	Ink jet	Ink jet	Ink jet	Vacuum fluorescence	LED	LED	Laser
Rated engine speed	6 ppm	N/A**	3 ppm	3 ppm	10 ppm	8 ppm	4 ppm	6 ppm
Maximum resolution (dots per inch)	300 x 300	360 x 360	600 x 300	300 x 300	300 x 300	400 x 400	300 x 300	600 x 600
Standard memory/Maximum memory	512K, 2MB	49K, 49K	1MB, 1MB	512K, 2MB	1MB, 5MB	6MB, 6MB	2MB, 4MB	2MB, 10MB
PCL version supported	PCL 4	None	PCL 3.1	PCL 3	PCL 5	PCL 5	PCL 4	None
GDI-only printer	■	■	■	■	■	■	■	■
Supports PostScript	■	■	■	■	■	■	■	■
Capacity of each standard paper cassette (sheets)	200 (letter or legal)	100 (letter or legal)	100 (letter, legal, or A4)	100 (letter, legal, or A4)	250 (letter, legal, or A4)	200 (letter)	70 (letter or legal)	100 (letter)
Optional paper cassette	N/A*	N/A*	N/A*	N/A*	500 (letter, legal, or A4)	200 (letter, legal, or universal)	N/A*	100 (legal)
Faxing and Telephony Features								
Fax modem speed (bps)	9,600	9,600	9,600	14,400	9,600	9,600	9,600	9,600
Sends/receives fax and prints simultaneously	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Faxes stored in PC's memory	■	■	■	■	■	■	■	■
Faxes from Windows applications	■	■	■	Optional	■	■	■	■
OCR software available	Calera OCR engine (\$39.95)	None	None	Caere's PageKeeper 2.0 (\$249)	None	None	None	QMS Fax Manager 1.4 (included)
Uses plain paper	■	■	■	■	■	■	■	■
Delayed-schedule faxing/Broadcast faxing	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Mailbox capability	■	■	■	■	■	■	■	■
Number of mailboxes	N/A*	N/A*	N/A*	10	5	25	N/A*	N/A*
Remote fax retrieval/Polling	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Number of pages held in standard memory	20	30	24	35	12	N/A†	18	N/A†
Scanning Features								
Rated optical resolution (dpi)	400 x 400	N/A*	N/A*	300 x 300	N/A*	400 x 400	N/A*	400 x 400
Maximum scanning size (inches)	8.5 x 24	N/A*	N/A*	8.5 x 400†	N/A*	8.5 x 14	N/A*	8.5 x 14
Twain driver	■	N/A*	N/A*	Optional	N/A*	■	N/A*	■
Adjustable brightness/contrast	■ ■	N/A*	N/A*	■ ■	N/A*	■ ■	N/A*	■ ■
Receives fax and scans simultaneously	■	N/A*	N/A*	■	N/A*	■	N/A*	■
Prints and scans simultaneously	■	N/A*	N/A*	■	N/A*	■	N/A*	■
Photocopying Features								
Optical resolution (dpi)	203 x 392	200 x 200	200 x 200	300 x 300	N/A**	400 x 400	300 x 300	400 x 400
Maximum enlargement/reduction of original	150%, 50%	N/A*, N/A*	N/A*, 70%	200%, 50%	N/A*, 70%	N/A*, 25%	N/A*, N/A*	154%, 45%
Maximum number of copies of an original	99	99	99	99	99	99	70	99
Capacity of automatic document feeder	30 sheets	20 sheets	20 sheets	20 sheets	30 sheets	25 sheets	10 sheets	20 sheets
Maximum copy size (inches)	8.5 x 24	8.5 x 14	8.5 x 11	8.5 x 400†	8.5 x 14	8.5 x 14	8.5 x 14	8.5 x 14
Receives fax and copies simultaneously	■	■	■	■	■	■	■	■
Prints and copies simultaneously/Collates	■ ■	■ ■	■ ■	■ ■	■ ■	■ Optional	■ ■	■ ■
Suspends jobs to allow use of other function	■	■	■	■	■	■	■	■
Functions as telephone/answering machine	■ ■	■ ■	■ ■	Optional ■	■ ■	■ ■	■ ■	■ ■
Auto-detection of fax/Distinctive-ring support	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■

N/A* Not applicable: The product does not have this feature

N/A** Not applicable: The manufacturer does not provide a specification for this feature

N/A† Not applicable: The number of pages stored is limited by the PC's memory.

1 The user must physically assist the unit when printing a document of this length

COVER STORY
Multifunction Printers

Relays HomeScan Avec 140	Ricoh MV715	Toshiba TF305	Xerox 3002	Xerox 3004	Xerox 3006
\$399.00	\$5,995.00	\$2,399.00	\$1,550.00	\$1,850.00	\$1,795.00
\$299	N/A*	\$1,700	\$999	\$1,199	N/A*
■ ■	■ ■	■ ■	■ Optional	■ ■	■ Optional
4.4 x 12.2 x 11.8	21.3 x 24.4 x 28.4	9.1 x 15.5 x 18.1	11.5 x 18.4 x 19.3	11.5 x 18.4 x 19.3	11.5 x 18.4 x 19.3
10	130	22	18	18	18
40W, 10W	500W, 92W	220W, 14W	45W, 17W	45W, 17W	45W, 17W
10:00-10:00 M-F; 12:00- 6:00 Sat.	9:00-7:00 M-F	10:00-7:00 M-F	6:00-6:00 M-F	6:00-6:00 M-F	6:00-6:00 M-F
1 year parts and labor	90-day on-site service	90 days parts	1 year overnight exchange	1 year overnight exchange	90-day on-site service
Thermal line	Laser	Laser	Ink jet	Ink jet	Ink jet
N/A**	10 ppm	4 ppm	3 ppm	3 ppm	3 ppm
200 x 200	300 x 300	300 x 300	300 x 300	300 x 300	300 x 300
64K, 64K	1MB, 6MB	1.5MB, 1.5MB	None, none	None, none	None, none
None	PCL5	None	PCL3	PCL3	PCL3
■	■	■	■	■	■
■	Optional (\$700)	■	■	■	■
N/A*	250 (letter, legal, or A3)	180 (letter or legal)	100 (letter, legal, or A4)	100 (letter, legal, or A4)	100 (letter, legal, or A4)
N/A*	250 (letter, legal, or A3)	N/A*	N/A*	N/A*	N/A*
9,600	14,400	9,600	9,600	14,400	14,400
■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
■	■	■	■	■	■
■	■	■	■	■	■
Xerox TextBridge 2.0 (included)	None	None	Xerox TextBridge 2.0 (\$299)	Xerox TextBridge 2.0 (included)	Xerox TextBridge 2.0 (\$299)
■	■	■	■	■	■
■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
■	■	■	■	■	■
N/A	99	1	1	5	10
■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
None	56	22	35	35	35
200 x 200	N/A*	N/A*	300 x 300	300 x 300	300 x 300
8.5 x 14	N/A*	N/A*	8.5 x 400 ¹	8.5 x 400 ¹	8.5 x 400 ¹
■	N/A*	N/A*	■	■	■
■ ■	N/A*	N/A*	■ ■	■ ■	■ ■
■	N/A*	N/A*	■	■	■
■	N/A*	N/A*	■	■	■
200 x 200	400 x 400	200 x 200	300 x 300	300 x 300	300 x 300
N/A*, N/A*	400%, 25%	N/A*, 72%	200%, 50%	200%, 50%	200%, 50%
1	99	99	99	99	99
10 sheets	30 sheets (\$795)	20 sheets	15 sheets	15 sheets	20 sheets
N/A*	11 x 17	8.5 x 14	8.5 x 14	8.5 x 14	8.5 x 14
■	■	■	■	■	■
■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
■	■	■	■	■	■
■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
■ ■	■ ■	■ ■	■ ■	■ ■	■ ■

tion than most of the units covered here, and output quality was just slightly behind the field leader (and the more expensive) Ricoh MV715. Note, too, that the Doc-It will accept a fax while printing, and accept a print job while receiving a fax. Doc-It includes 90 days of on-site service, with a one-year warranty on parts and labor.

Okidata Doc-It 4000. List price: \$1,999; paper cassette mechanism for second cassette, \$329; 200-sheet universal tray, \$109; 1MB SIMM, \$159. Okidata, 532 Fellowship Rd., Mount Laurel, NJ 08054; 800-654-3282, 609-235-2600.

Circle 473 on reader service card

Panasonic Communications
and Systems Co.

Panasonic PFC KX-SP100

BY BRUCE BROWN

The Panasonic PFC KX-SP100, the least expensive unit in this roundup with a laser-quality printer, delivers almost everything a home office or individual user could want for an enticing \$999 list (\$765 to \$799 street). In addition to its 4-ppm LED printer, the Panasonic has a 9,600-bps fax and a 200-dpi photocopier but lacks scanning and PC faxing capabilities.

With a small footprint of only 6.3 inches by 15.7 inches, the Panasonic stands vertically like a mini-tower PC; its 70-sheet input tray and 50-sheet output tray extend from the right side. The only flaw in the unit's compact design is the oddly placed parallel port, located on the front right-hand side. Once it's set up, the Panasonic's 11 buttons and 16-character LCD screen make selecting functions and features easy.

Of the systems in this review selling for less than \$1,000, only the Brother MultiFunction Center 4500 ML outperformed the Panasonic's 4-ppm score on our text speed tests. The Panasonic's output has the clarity and crispness typical of 300-dpi laser printers. Be advised, however, that the Panasonic's graphics printing scores were slow, at less than 1 ppm on some tests.

As a fax, the Panasonic had the best



reception score in this review (1 minute 25 seconds), and its plain-paper output was very clear at 150-by-150 resolution. On our fax transmission test, the Panasonic's results were much weaker: The unit took a relatively slow 1 minute 32 seconds to send the test sheet, and its resolution (75-by-80) was the poorest in this review.

To send faxes, you must attach a telephone to the unit, since the Panasonic doesn't come with a handset. You can hook up an answering machine to the Panasonic and the unit will automatically differentiate between fax and voice calls so you can use a single line for both incoming messages and faxes. Incoming legal-size faxes are automatically shrunk to letter-size, and the Panasonic's 18-page fax memory stores transmissions if the printer is already busy.

The Panasonic was among the slowest units as a photocopier, taking nearly a minute to copy our test image in both line-



QMS Inc.

QMS 2001 Knowledge System

BY BRUCE BROWN

The rugged, easy-to-use QMS 2001 Knowledge System (\$1,649 list, \$1,499 street), targeted at small office users or individuals in a corporate setting, is a mix of hits and misses. The printer's 600-dpi 6-ppm laser engine produced crisp output relatively quickly, but can print from Windows only. As a copier the unit offers welcome features such as multiple copies and collating, but we found it slow on some types of images. It could scan at a high 400 dpi, but it couldn't feed photos; you'll have to stick with scanning paper items only. Finally, while the included software lets you scan originals to your PC and fax them through your fax modem (if you have one), buyers in this market may miss standalone-fax functionality.

The software that comes with the QMS is the key to its ease of use. QMS Office 4.0B8 has several components, including a Copy Manager to control copying and scanning and a Delrina WinFax Pro-compatible Fax Manager that lets you use the QMS to scan originals to fax with your own fax modem. Run by a 16-MHz Intel RISC processor with 2MB standard RAM, the QMS has a 100-sheet paper input cassette and a 50-sheet output tray. The 21-inch-wide by 15-inch-deep footprint grows to 21 by 30 inches with input and output trays installed, so be sure you have enough room. A required

proprietary parallel interface cable is included.

As a Windows GDI printer the QMS couldn't run our DOS-based Text Speed test, but on our Windows Application suite its speed was on a par with the other laser-based units in this roundup and much faster than the ink jet competitors. Output was far superior to ink jets, as well, with text and halftone reproduction that was among the best of all the units.

Our test photograph wouldn't feed into the QMS for scanning (it was either too thick or too smooth), but the unit was able to feed paper samples easily. Scanning resolution was very high, reaching the full 400 by 400 dpi QMS claims. Its score of 16 discernible gray-scale steps was only fair, however.

The QMS lets you copy in either line-art or gray-scale mode, and in 200-dpi or 400-dpi resolution. You can make up to 99 copies each of 20 originals stacked in the automatic document feeder, and the software lets you crop, scale, collate, and even add watermarks. Copy quality was acceptable, but the only reasonable copy speed was 44 seconds in 200-dpi line-art mode. Single-page copy time for the complex test page ranged from 1 minute 28 seconds in 400-dpi line-art mode to an interminable 16 minutes 28 seconds in 400-dpi gray-scale mode.

The Energy Star-complaint unit powers down to 23 watts in sleep mode, and you can set it to power down after a period of inactivity anywhere from 1 to 999 minutes.

A moderate-speed printer that's slower in other operations, the QMS 2001 Knowledge System's heavy duty construction and extreme ease of use make it a reasonable choice for small-business applications where a single user wants a unit for printing, copying, and light scanning.

QMS 2001 Knowledge System. List price: \$1,649; 6,000-page toner cartridge, \$145; 30,000-page OPC, \$199. QMS Inc. One Magnum Pass, Mobile, AL 36618; 800-523-2696, 334-633-4300; fax, 334-633-4866.

Circle 475 on reader service card

Panasonic PFC KX-SP100



SUITABILITY TO TASK	
Printing	Good
Faxing	Good
Copying	Good
Scanning	Good

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art and photo modes. Copy quality was acceptable but not as sharp as regular printed output. The Panasonic captures images only at 200 dpi but uses resolution-enhancement technology to print them at 300 dpi.

This Energy Star-compliant unit powers down after 15, 30, or 60 minutes of inactivity to as low as 18 watts.

Although it lacks PC faxing and scanning capabilities, the Panasonic PFC KX-SP100 print quality and overall performance make it one of the best values in this roundup.

Panasonic PFC KX-SP100. List price: \$999; 1MB RAM upgrade, \$149; 2MB RAM upgrade, \$225; 5-envelope feeder, \$34.95; 1,600-page toner kit, \$14.95; 6,000-page drum unit, \$89.95. Panasonic Communications and Systems Co., Two Panasonic Way, Secaucus, NJ 07094; 800-742-8086, 201-348-7000.

Circle 474 on reader service card

QMS 2001 Knowledge System



SUITABILITY TO TASK	
Printing	Excellent
Faxing	N/A*
Copying	Good
Scanning	N/A**

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THE *(our desktop laser printers keep no secrets from network managers)* COMPANY



4505 LASER

600 x 600 DPI

5 PPM

UP TO 8.5 x 14

UP TO 16 MB RAM



4510 LASER

600 x 600 DPI

10 PPM

UP TO 8.5 x 14

UP TO 16 MB RAM



4520 LASER

800 x 800 DPI

20 PPM

UP TO 11 x 17

UP TO 125 MB

Xerox desktop laser printers think about you. That's why the 4500 family of network printers have bi-directional client and network software. It enables easy installation, allows remote configuration and gives usage and charge-back reports in real time. Your end-users stay happy because it takes them through the printing process step by step. Of course, it all comes with the Xerox Total Satisfaction Guarantee. So why settle for printers you don't have to think about, when you can get printers that think about you. To talk with us, call **1-800-34-XEROX ext.102**.



THE DOCUMENT COMPANY
XEROX



Multifunction Printers



Relisys

Relisys HomeScan Avec 140

BY BRUCE BROWN

It's easy to dismiss the Relisys HomeScan Avec 140 at first glance. After all, it uses thermal-paper rolls for print jobs, received faxes, and copies, so it isn't suitable as a primary output device. But at just \$399 list (\$299 street), the little Relisys commands respect for what it delivers at its price. The HomeScan gives you a thermal-line printer (for printing from Windows only), a 9,600-bps fax, 200-dpi one-bit scanner, and convenience copying in a footprint less than a foot square. It's good as a versatile second device or as a companion to your home system if you need to get work done away from the office. What's more, at just 10.3 pounds, the HomeScan is also compact enough to use as a transportable device when traveling to remote sites.

The Relisys comes with a load of software, including SigNet Solutions' HomeScan driver 3.3, DocuMagix's PaperMaster 1.0 document organizer, Xerox's TextBridge for Windows 2.0 OCR software, and Delrina's WinFax Lite 3.0 fax software. Hardware installation is simple and software installation is automated, though it does take time and disk space (9.5MB) to install the four programs.

The Relisys's control panel couldn't be much simpler, with three big buttons on the front to start faxes or copies and two-way switches on the side for normal and fine resolution and light and dark

modes. To be sure, the low price means some tradeoffs in convenience. There are no multitasking capabilities, and the Relisys can't be used to print documents from DOS applications, since you must use the WinFax Lite print driver for jobs. To print, you choose the fax driver as the printer, then put an asterisk in the recipient telephone-number field. Printing is appropriate for text only, since the Relisys doesn't support gray-scale printing except on a very rudimentary level; this is an all-black or all-white output device in all modes. Print speed on our Windows Application suite was the slowest of the bunch, with only a page per minute produced from Microsoft Word.

To transmit a hard-copy fax you need to attach a telephone to dial the recipient's number, though you can use WinFax Lite to send faxes via Windows applications. Faxing was slow, taking 1 minute 36 seconds to send a fax and 1 minute 45 seconds to receive one. Fax quality was good, however, with the test received-fax image scoring 200 dpi both horizontally and vertically.

The same high resolution also serves the Relisys well in scanning, where it's a good candidate for OCR applications. You can select light or dark and normal or fine modes, but that's all the scanning control included in the bare-bones Twain driver interface. Copying was

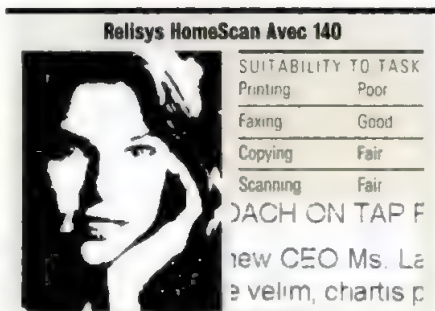
fast, at 25 seconds per page. But here, too, you're limited to line-art mode—forget copying gray-scale images or photos.

Some may gripe about the other features that are absent from the Relisys,

such as multitasking (you can't fax and print at the same time). But all the compromises of the Relisys HomeScan Avec 140 are fairly insignificant when you consider what you get for the price. It may be worth a look.

Relisys HomeScan Avec 140. List price: \$399. Relisys, 919 Hanson Ct., Milpitas, CA 95035; 800-945-9000, 408-945-3113; fax, 408-945-1499.

Circle 476 on reader service card



Relisys HomeScan Avec 140

SUITABILITY TO TASK	
Printing	Poor
Faxing	Good
Copying	Fair
Scanning	Fair

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Ricoh Corp.

Ricoh MV715

BY M. DAVID STONE

The Ricoh MV715 is aimed at a large small office with fairly hefty copying and fax needs. Although the Ricoh MV715 fits the definition of multifunction printer, there's no mistaking its primary function for anything other than the 15-ppm laser-based copier it is, combined with a high-end fax machine.

The base unit (\$5,995 list), which measures 21.3 by 24.4 by 26.4 inches and weighs 129.8 pounds, unquestionably looks like a copier, complete with flip-top flat-bed scanner. Add the 30-page automatic document feeder (\$795) and the \$1,195 paper-feed unit that delivers two additional 250-page paper drawers (for a total of four) and the unit becomes a small-refrigerator-size copier on wheels. To make it a printer, you have to buy the HP LaserJet III-compatible interface option for \$595. (An Adobe Postscript option is also available.)

The front panel offers a mix of fax-style controls (complete with quick-dial keys and a numeric keypad) and copier controls, including lights to indicate the percentage of reduction (25 to 93 percent) or enlargement (100 to 400 percent). Setup is handled by a service technician and is usually included in the price.

Maximum resolution for copies and faxes is 400 dpi. In our tests the copier turned out crisp text in text mode, and a reasonably continuous-tone gray-scale photo in photo mode, with only a little

Multifunction Printers

posterization. And it managed this output in an impressive 14 seconds. The 400-dpi super-fine fax mode works only with another 400-dpi machine, but even with fine mode, the laser engine produces dark, highly readable faxes. Note, too, that Ricoh offers a \$2,500 Group 4 fax option.

The 300-dpi, 10-ppm printer mode is equally impressive. Text was sharp throughout the range of font sizes in our desktop-publishing image, and photos are better than expected for 300 dpi, though they show posterization. Text speed on PC Labs benchmark tests led the pack, at 7 ppm. Graphics speed was a respectable 1.7 gppm.

Paper handling is a strong point. In addition to the options on our review unit, Ricoh sells an \$845 three-bin sorter—with one bin each for faxed, printed, and copied output. It also sells a \$595 duplex option that replaces one of the paper drawers. Note, too, that the unit performs some neat tricks. Fax it a legal-size page, for example, and it will automatically print on legal-size paper if you have any loaded or shrink the job to letter-size if you don't.

Even better, it will gracefully accept simultaneous print and fax jobs. It can hold up to 56 pages in memory, expandable to 1,200 pages with the optional hard disk (\$1,099). Ricoh includes a 90-day on-site warranty. If you need this level of copier and fax functionality, the MV715 offers a highly capable solution, with a printer thrown in as a reasonably low cost option.

Ricoh MV715. List price: \$5,995; HP printer option, \$595; Adobe PostScript option, \$700; automatic document feeder, \$795; 3-bin sorter, \$845; paper-feed unit with two additional paper drawers, \$1,195; Group 4 fax, \$2,500; duplex option, \$595; 2MB printer RAM, \$245; 1MB fax RAM, \$295; 40MB hard disk for storing 1,200 fax pages, \$1,099; phone handset, \$52. Ricoh Corp., 5 Dedrick Place, West Caldwell, NJ 07006; 800-637-4264, 201-882-2268; fax, 201-882-5891.

Circle 477 on reader service card



Toshiba America Information Systems Inc.

Toshiba TF505

BY M. DAVID STONE

At first glance the Toshiba TF505 looks like a standard plain-paper fax machine, with a fax-related front panel for faxing and copying, and the usual phone handset. But that would be a waste of the 4-ppm 300-dpi laser engine inside. The emphasis on faxing is clear, but the unit is a capable laser printer that produces sharp output. Its natural habitat is the home office or any desktop that needs a full-function fax machine plus a quality laser printer. Alas, the price—\$2,399 list, \$1,700 street—makes it more expensive than buying a separate laser printer and plain-paper fax machine.

At the time of this writing, the Toshiba is a GDI printer for use with Windows applications only (the required driver is included). The company promises an optional upgrade, available through authorized dealers no earlier than July, for printing from a DOS window in PCL 5 or in PostScript mode, by way of a Postscript clone.

We found print quality from the unit better than average for a 300-dpi laser printer, which makes it far better than much of the printer output in this review. Edges on text were acceptably crisp throughout the range of fonts in our

desktop-publishing sample. More impressive, a gray-scale dithering feature in the Image Vision III driver lets you print photos without the obvious dithering patterns that are typical for this resolution. Throughout

was a little slower than average for laser-based units we tested, but not significantly so.

The fax side of the package offers a full set of features, from a 20-page automatic document feeder to 50 speed-dial numbers, and automatic broadcast faxing for four groups of up to ten numbers each. The laser engine gives incoming faxes a dark, crisp look to aid readability. As with most fax machines, the Toshiba uses an LCD-based menu to change settings. But it's cumbersome to use, with lots of button pushing. Note that the Toshiba can accept a fax while printing, and save it to RAM. If you start a print job while it's receiving a fax, the Toshiba driver will save the print job to disk and print it after the fax is finished.

The copier feature is strictly convenience-copy-level, at a maximum 200 dpi. But here again, the laser-print engine lets the unit take full advantage of the resolution available. A halftone mode with 16

Toshiba TF505



SUITABILITY TO TASK	
Printing	Excellent
Faxing	Good
Copying	Fair
Scanning	N/A

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shades of gray helps when copying photographs. But while it's a big improvement over copying in standard black-and-white mode, it leaves the photos heavily posterized.

The Toshiba TF505 doesn't try to be a jack-of-all-trades. There's no scanning function, and you can't use the unit to fax from your PC. Instead, it focuses on the two functions you're most likely to need—printer and fax machine—and does both well. You'll have to decide whether having one unit is worth a premium over buying a separate fax and printer.

Toshiba TF505. List price: \$2,399; 20-sheet output tray, \$19.95; developer drum unit with one toner cartridge, \$280; toner cartridge, \$10. Toshiba America Information Systems Inc., Electronic Imaging Division, 9740 Irvine Blvd., Irvine, CA 92718; 714-583-3471, 201-515-2200.

Circle 478 on reader service card

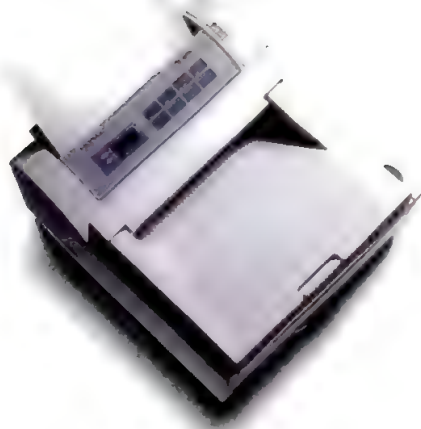
Ricoh MV715



SUITABILITY TO TASK	
Printing	Excellent
Faxing	Good
Copying	Excellent
Scanning	Good

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Xerox Corp., Desktop Document Systems

Xerox 3002 Xerox 3004 Xerox 3006

BY BRUCE BROWN

Xerox manufactures three desktop multifunction models, all based on a 300-dpi 3-ppm ink jet platform with copy and fax capabilities added. The Xerox 3002 (\$1,550 list, \$999 street) is the bargain of the bunch and the best one for individual users. The Xerox 3004 (\$1,850 list, \$1,199 street) is more suitable for small workgroups. It adds scanning, PC fax functions, and a faster modem. These two are sold by Xerox Office Products centers and retailers. The Xerox 3006 (\$1,795 list), targeted for corporate workgroups and sold direct only, has more fax mailboxes and speed-dial numbers, as well as a higher-capacity automatic document feeder (ADF).

With all three machines, we found output quality isn't as sharp as from laser printers, but the units are easy to use and well built. They are also a little pricier than competing units we looked at, but some won't balk at paying a premium for the Xerox nameplate and the extra features and durability that come with it.

Each of these three look-alikes (with a 16.4-inch by 19.3-inch footprint) is HP

DeskJet 500-compatible. They also share the same 128-nozzle ink jet print-head and 100-sheet page feeder. You can add the 3004's scan and PC fax features to the 3002 and 3006 with a \$299 kit, which includes a serial card, cable, Twain driver, and OCR and fax software.

Setting up the 3000 series is a snap, literally. You just snap in the ink cartridge, load paper, plug it in, and you're ready to go. There's not even a power switch (they power down to under 17 watts at rest). The control-panel layout is uncluttered, with 11 buttons and a two-line, 20-character LCD screen. The ADF cover hides 43 more buttons for the dial pad, quick dialing, and other controls.

Printing, faxing, and copying performance were nearly identical among the three models. Printer throughput was respectable for the technology: 2.5 ppm on both our Text Speed and Graphics Speed tests. Output was decent, but less than laser quality: Telltale ink jet fuzziness is apparent upon close inspection. Fax speed is a little better than the average for the pack, and at about half a minute per page, the Xeroxes are relatively quick copiers. Test copies were good but not great, with limited crispness (again, because of the ink jet) and noticeable banding. The 3000 series can make up to 99 copies of documents and can colate automatically. You also can reduce to 50 percent or enlarge to 200 percent in 1 percent increments.

One area where the Xerox 3000 models shine is operability. They all can print while receiving faxes and receive faxes while a print job is running, plus each will reduce up to 70 percent automatically to make incoming faxes fit on one page. Standard 35-page fax memories (upgradable to 115 pages) keep faxes safe while you're printing or in case

paper or ink run out. Using a Touch-tone phone you can remotely receive faxes stored in mailboxes.

The Xerox 3002 has a 9600-bps fax operation, which is rated at 10 seconds per page of text. There are 60 speed-dial and 20 one-button-dial numbers, as well as a 15-page ADF. The \$200 premium for the 3004 gets you a 14.4-Kbps modem, scanning, PC fax support, five fax mailboxes, fax group dialing for five groups, and 80 speed-dial numbers. In addition, this package includes Xerox's TextBridge OCR software, Delrina's WinFax Lite, and a Windows Twain driver. Scanning with the 3004 took over 15 minutes for our test photo, though, since the Twain interface had no control to select only part of the image. The scanned test image was excellent, however, with 300-by-250-resolution and 30 discernible steps in gray-scale mode.

The top of the 3000 series is the 3006, with a 20-page ADF, 10 fax mailboxes, 15 fax group-dial numbers, and 100 speed-dial numbers. With its firmware-based capacities, the 3006 becomes a versatile fax server for a small group, with the addition of convenience printing and copying. The 3006 also gets you a 90-day on-site warranty; with the 3002 and 3004, you get overnight exchange for one year.

As long as ink jet output isn't a problem, the build quality and thoughtful features make the Xerox 3000 series worth your attention. □

Xerox 3002. List price: \$1,550. **Xerox 3004.** List price: \$1,850. **Xerox 3006.** List price: \$1,795. Options: 1.5MB RAM upgrade, \$199; black-ink cartridge, \$45; PC Connectivity Kit (included with 3004), \$299. Xerox Corp., Desktop Document Systems, 3400 Hillview Ave., Palo Alto, CA 94304; 800-349-3769, 415-813-6800. Circle 479 on reader service card

Xerox 3002



SUITABILITY TO TASK	
Printing	Good
Faxing	Excellent
Copying	Good
Scanning	N/A

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Xerox 3004



SUITABILITY TO TASK	
Printing	Good
Faxing	Excellent
Copying	Good
Scanning	Good

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Xerox 3006



SUITABILITY TO TASK	
Printing	Good
Faxing	Excellent
Copying	Good
Scanning	N/A

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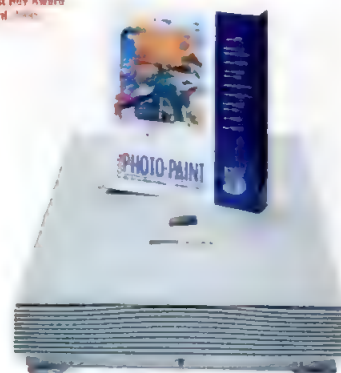
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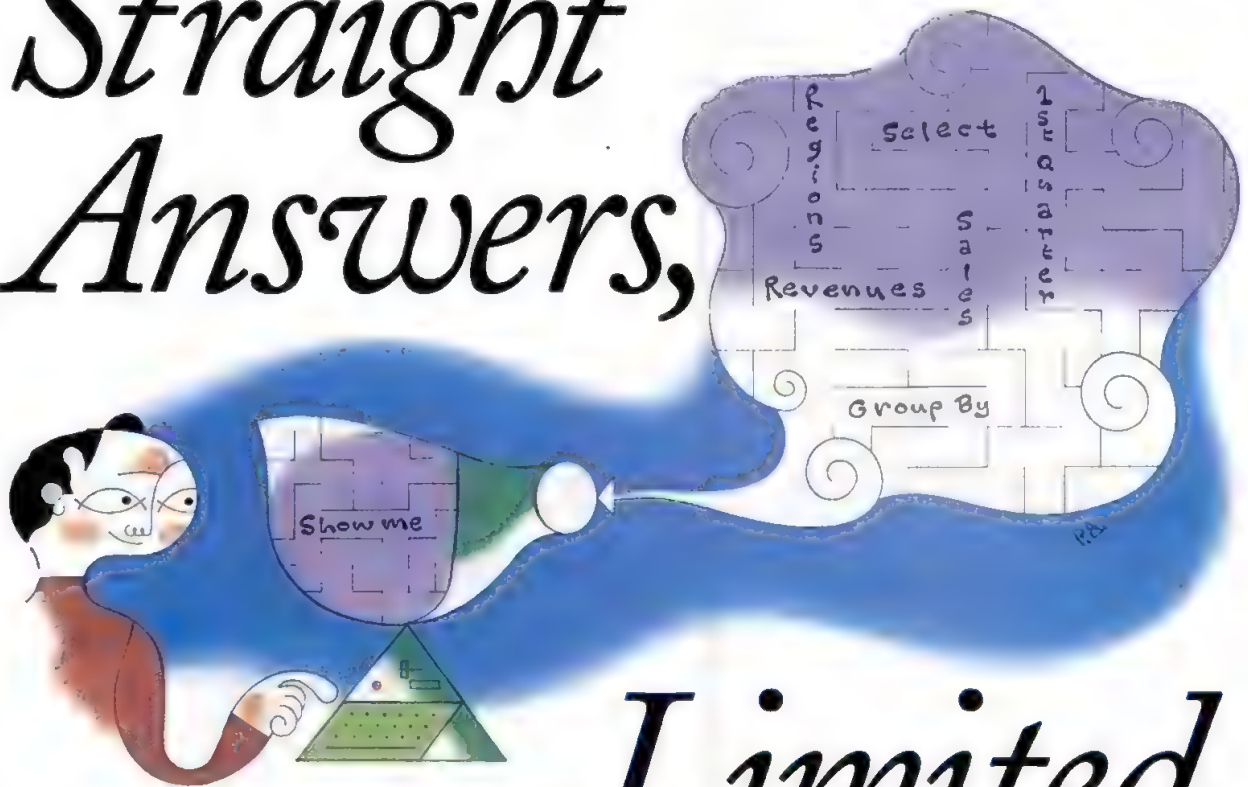


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SQL QUERY AND REPORTING TOOLS

Straight Answers,



Limited Risks

Today's SQL query and reporting tools offer unmatched access to relational databases. But can they be made safe for nonspecialists?

By Brian Butler and Thomas Mace

Right after the first data was created, someone realized that it would have to be analyzed in order to be useful. The basic need to extract meaningful business information such as rankings, statistics, and trends from gigantic relational tables is still somewhat unfulfilled: As yet, there is no solution that's right for everyone.

The latest ad hoc query and reporting tools for client/server SQL (Structured Query Language) databases, though, are coming close to developing one. Their aim is easily stated: Give business users the ability to browse, consolidate, analyze, and meaningfully present the information that resides in large relational databases. Our tests of seven leading packages against a business-oriented relational database show that the day of

IN THIS REVIEW

Products reviewed:

Borland ReportSmith for Windows 2.5	214
BusinessObjects 3.1	220
Crystal Reports Professional 4.0	222
Esperant 2.1	230
InfoMaker for Windows 4.0	235
Intersolv Q+E 6.1	238
Visualizer for OS/2 1.11	240
Anatomy of a Query Tool	210
Editors' Choice	211
Highlights	214
Suitability to Task	216
Usability Testing	227
Summary of Features	234

APPLICATIONS DEVELOPMENT

SQL Query and Reporting Tools

achieving this goal is in sight.

Naturally, there are caveats. Overall, we found that the most effective query tools are the most traditional. These, however, are also the ones that demand the most knowledge of database structure and SQL. If your end users don't have a good working knowledge of relational theory, they can easily wind up with incomplete or seriously misleading results.

But we also saw promising results from a newer generation of intelligent query tools targeted at business-savvy SQL illiterates. These tools rely on an intelligent "business-object" layer that abstracts the data source (this layer must be created by an administrator). End users can interact with familiar business entities such as "fourth-quarter sales" and "revenue" instead of tables and columns. All the products we tested are moving in this direction; it's just a matter of time until these intelligent designs outclass the old stalwarts. (For a discussion of our test methodology, see "Usability Testing: SQL Query and Reporting Tools.")

WHAT WE TESTED

Initial research for this story turned up more than 70 commercially available ad hoc query and reporting tools. Our selections for the review lineup were guided by the desire to cover widely used tools and

to survey a variety of competing technologies and approaches.

The products chosen meet several criteria. All are positioned as end-user tools; all provide a graphical interface for constructing queries; and all include facilities for creating and printing standard reports.

*Using SQL means that
you have to know a lot
about relational theory.
If you don't, you can
shoot yourself in the foot.*

All are hosted in Windows or OS/2 and supply native or ODBC drivers for connecting to major SQL database servers over a standard PC LAN. All provide some means of abstracting underlying database structures to aid end users (although the degree varied from simple column aliasing to a full logical abstraction).

Among the tools not reviewed, Cognos's Impromptu 3.0, a brand-new release, just missed our cutoff date, and Brio Technology's BrioQuery Explorer was recently reviewed in our First Looks section ("BrioQuery: Tool for Exploring Data," March 28, 1995, page 47).

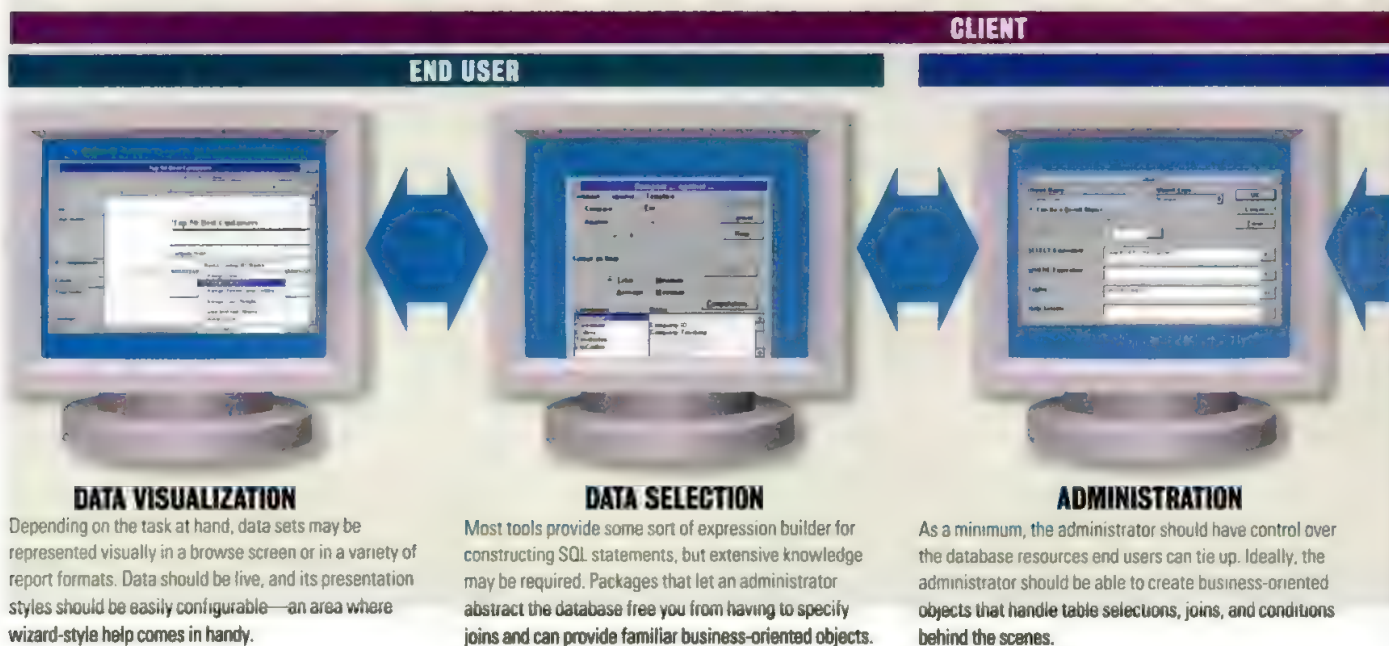
SAFE SQL, ANYONE?

All the products in this evaluation help users generate SQL statements to retrieve data from large relational databases. Since the early seventies, SQL, a product of IBM Research, has been the standard for this task. Its syntax is clear and concise, and (academic quibbles aside) it provides a complete relational query system.

Unfortunately, using SQL means that you have to know a lot about relational theory. If you don't, you can easily shoot yourself in the foot. A SQL Select statement with an incorrect Where clause can produce results that make your sales look a whole lot better than they actually are, or bring your server to a grinding halt as you generate a huge Cartesian product. Other, more subtle traps can be just as dangerous.

Although all of the tools we evaluated offer GUI interfaces to help the average business user write SQL queries, they differ in the amount of database knowledge they require the user to have. Four of the tools—Borland ReportSmith for Windows 2.5, Crystal Reports Professional 4.0, InfoMaker for Windows 4.0, and Intersolv Q+E 6.1—require, at least in some cases, that users understand which joins are needed and see that they are applied. While these tools can at least prompt a join, they may not prompt the right one.

Anatomy of a Query Tool



SQL Query and Reporting Tools

For OS/2:**Visualizer for OS/2 1.11**For Windows:**None at this time**

The ideal query and reporting tool should help end users perform complex analysis and reporting tasks without de-

manding a degree in relational database theory. Our Editors' Choice, IBM Corp.'s Visualizer for OS/2 1.11, comes closest to that ideal. Visualizer Query for OS/2, the core of the Visualizer suite, together with add-ons Visualizer Charts and Visualizer Plans, were the only tools able to complete all our tests. Intuitive visual query and reporting interfaces treat databases, queries, and reports as drag-and-drop objects. The Visualizer package is rounded out with capable statistical analysis and forecasting modules and multimedia database capabilities.



Two other tools, BusinessObjects 3.1 and Esperant 2.1, address joins and related issues through a database abstraction layer. The database administrator creates a set of business-oriented logical entities for end users that are derived from the relational data but may not physically exist in the database. These entities include the join specifications and required calculations.

The end user queries these entities rather than the underlying data. Esperant 2.1 is clearly the most ambitious of the two. In theory, its SQL Expert technology, which offers an English-based query syntax, can prevent a user from issuing an incorrect or misleading query (in practice, we found it may prevent legal queries, too).

Visualizer for OS/2 1.11 takes yet an-

The coming release for Windows promises to set new standards on that platform.

An honorable mention goes to BusinessObjects 3.1, the tool that did the best job of structuring an end-user-oriented abstraction of the underlying database. But it does not yet offer the flexibility and power needed for a full range of analysis and reporting tasks.

We were also impressed with Intersolv Q+E 6.1 and Borland ReportSmith for Windows 2.5—two traditional tools aimed at sophisticated power users. Q+E offers maturity, stability, a consistent interface, and the company's broad set of ODBC drivers. ReportSmith is an exemplary report writer but offers few administration features for aiding novices.

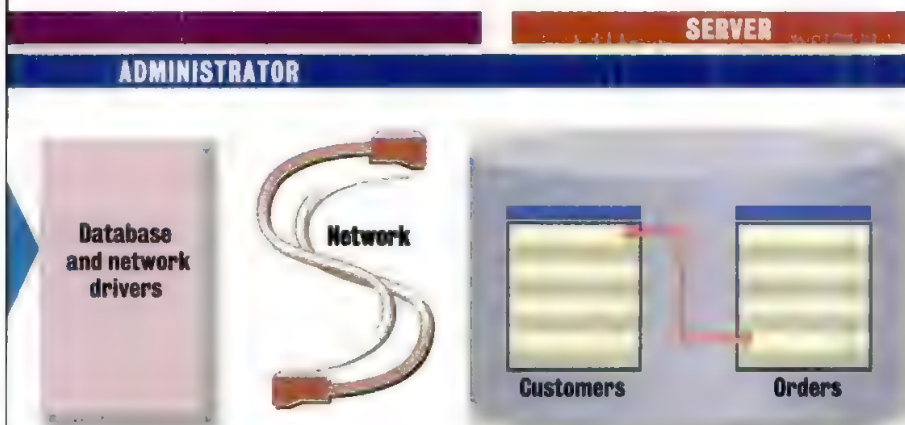
Powersoft Corp.'s InfoMaker for Windows 4.0 offers the power and productive interface of the company's PowerBuilder development tool, but it was somewhat unstable in operation. Software AG's Esperant 2.1 offers a sophisticated database abstraction layer that actively prevents false or misleading queries. Sadly, the current release suffers from bugs. Crystal Reports Professional 4.0 is a capable report writer that performs almost all data manipulation on the client.

other approach to insulating end users from SQL. The end user interface is based on drag-and-drop table, query, and report objects that have built-in intelligence. Users do not have to specify joins.

Once the data is correctly returned, the packages offer widely differing tools for analysis and presentation. Most offer a good set of report-writing tools; some—ReportSmith in particular—are essentially specialized report writers. Crystal Reports combines analysis and reporting by defaulting to a drill-down view for any report that summarizes data. ReportSmith, BusinessObjects, and Visualizer also offer pivot tables. Five packages—BusinessObjects, Crystal Reports, InfoMaker, Q+E, and Visualizer—offer charting modules.

CLIENT/SERVER CONSIDERATIONS

Ad hoc query and reporting tools work in a client/server environment and are subject to the same considerations as are other client/server applications. Ideally, they should make efficient use of the architecture, minimize network traffic, and leverage the full extent of database server resources. Most of the products we saw were well behaved; a few were not. For example, Crystal Reports, a tool originally designed to work with local flat-file data, brings the entire data set needed for a report to the client with a single catch-all

**DRIVERS AND THE NETWORK**

A good selection of native or ODBC drivers lets you connect to a variety of back ends. Products should make good use of the client/server architecture and keep network traffic to the minimum needed. Support for native database features is desirable.

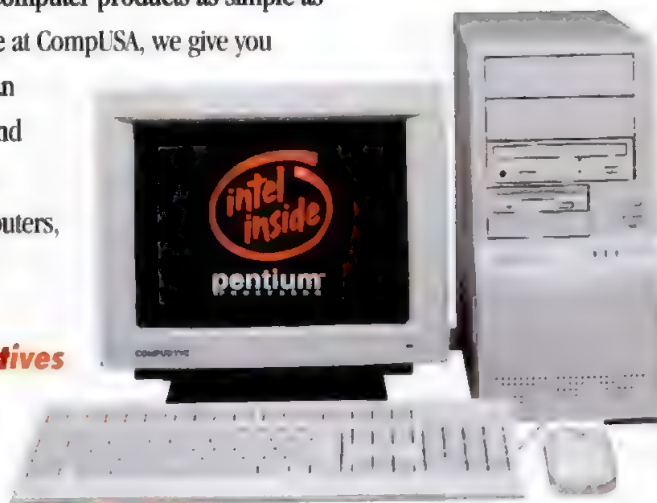
DATABASE SERVER

The database server receives native or ODBC SQL from the query tool, performs the required Select, and returns the data. If correct joins and other conditions are not specified by the tool, they must come from the end user.

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HIGHLIGHTS

SQL Query and Reporting Tools

SQL is for specialists only. But one of client/server's biggest selling points is easy access to relational data. Today's ad hoc query and reporting tools wrestle with this contradiction. Can they offer a safe environment in which nonspecialists can build correct and meaningful queries? While all the tools we tested offer some hand-holding, very few are suitable for the SQL illiterate.

A DATABASE ABSTRACTION LAYER addresses the needs of non-technical users by letting them query familiar business entities instead of raw tables and columns. While few query tools provide high levels of abstraction today, most can do some basic aliasing and query building. The more sophisticated the abstraction, the greater the level of administrator involvement required.

query, effectively turning your database into a file server.

Your role as database administrator varies greatly depending on the type of tool deployed. Two-tier products like BusinessObjects and Esperant demand a large up-front time investment to develop the logical layer.

Resource management is an important concern. BusinessObjects, Esperant, and InfoMaker let you put a ceiling on long-running queries; these three, as well as ReportSmith and Visualizer, also let you set a maximum for the number of rows returned. Crystal Reports and Q+E do not support either governor feature. Three of these products—InfoMaker, Q+E, and Visualizer—allow read/write database access; the rest are designed for read access only.

Your decision on which ad hoc tool to use will be based on the analysis and reporting needs of your end users, on their knowledge of databases and SQL, and on your development resources and administration requirements. Each tool examined here offers a different combination of possibilities; the reviews that follow will help you sort the products out.

REPORTING is the meat and potatoes of query tools, and the best report writers can provide ad hoc analysis and drill-down features such as trends, statistics, and forecasting as well. Some but not all packages provide business charting. We saw a wide variety of report writers, from the fairly limited to the phenomenal. The most sophisticated report writers, however, typically demand a database-savvy user.

DATABASE CONNECTIVITY features vary widely. While many packages use ODBC drivers, some offer native connections as well, either in the box or as an option. Look for packages that use the client/server architecture efficiently and offer governor features that let you limit database resources that end users can tie up.

Borland International Inc.

Borland ReportSmith for Windows

BY STEPHEN W. PLAIN

Honesty is an admirable quality in a product, and Borland ReportSmith for Windows 2.5 doesn't pretend to be something it's not. This mature report writer provides a sophisticated WYSIWYG interface that lets database-savvy users create and distribute a variety of complex, good-looking reports. It also demands little setup from a database administrator. But ReportSmith isn't intended to take novices much beyond simple tasks, and it provides only a limited abstraction of the underlying database.

ReportSmith supports 20 different databases including Informix, Microsoft SQL Server, Oracle, SQLBase, and

Sybase SQL Server, as well as many standard local data formats.

REPORT DESIGN

One of ReportSmith's most innovative features is its use of live data during the design phase of report writing. The line between design and print modes is almost irrelevant since any reformatting you do is with live data. The default mode, Presentation, displays the report with all of its data exactly as it will print.

To create a new report, you first select a report type and style. Four basic types are available: columnar, crosstab, form, and label. ReportSmith does not explicitly support master/detail reports, but you can easily produce them by first creating a columnar report based on the master table's information. You can then insert a detail report using the same query builder to create the detail section that you used for the master section.

A powerful advantage to this approach is that you can issue a completely separate query for the detail section and even use a different connection to a different database server. The only problem this approach creates is that the master section, which is rarely column-based, needs to be moved to a header section to be formatted. In other words, you cannot make a master/detail report based on a form report style.

Each report type has a corresponding list of styles that determine the look of the report through preset formatting options. You can also save your own creations as custom styles. The only major void is the absence of an integrated charting engine.

QUERY DESIGN

After you've defined the style and type, you specify a data source with the comprehensive query designer. The dialog has

SUITABILITY TO TASK Borland ReportSmith for Windows

Query and analysis	Fair
Connectivity	Excellent
Reporting	Excellent
Setup and administration	Good

Our Contributors: BRIAN BUTLER is a contributing editor of *PC Magazine*. JAMES L. EOFF is a technical consultant at Client/Server Solutions, a St. Louis firm specializing in SQL database benchmark testing and client/server applications development. GABRIELLE GAGNON is a Boston-based information technologies manager. STEPHEN W. PLAIN is a frequent contributor to *PC Magazine*. THOMAS MACE was the associate editor in charge of this story, and JAY MUNRO was the project leader.

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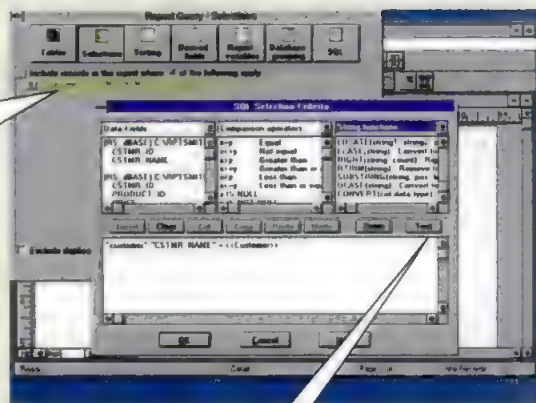
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BORLAND REPORTSMITH

■ One of ReportSmith's most user-friendly features is its English-like Where clause builder. In the Selection window, you can create compound expressions by selecting context-sensitive choices from drop-down list boxes

■ ReportSmith does not provide a governor feature for limiting the amount of time a query can be allowed to run, but it does let the administrator limit the number of rows returned



■ You choose data components, operators, and functions in the expression builder. The Test button checks the syntax

seven sections: Database Grouping, Derived Fields, Report Variables, Selections, Sorting, SQL, and Tables. The Tables section lets you define the tables and fields you want to include in the report through a series of list boxes. You can locate tables quickly by creating named connections—definitions of server locations and user names. You also must define any links between tables in this section.

While ReportSmith's query designer is organized similarly to InfoMaker's, it adds a user-friendly twist to filtering the data. The Selections section determines the Where clause in the SQL statement but allows you to create the SQL using an

English-like syntax. You add lines of selection criterion by choosing from lists of predefined phrases and operators, then enter literal values where prompted. The Database Grouping section uses a similar interface for building the Having clause. You can view and edit the SQL statement, but if you make changes, you are kept from going back to the dialog-based procedure.

The Report Variables section lets you define custom dialogs that will prompt for information during subsequent executions of the query. You can simply prompt for an entry, or you can present a series of radio buttons, a list box of literal values, or a list box of data from a table as

appropriate responses. This feature is well implemented and adds considerable flexibility.

MEMORY MANAGEMENT

ReportSmith does not provide query governors for limiting the execution time of a server's query processing, although it will let the administrator limit the number of rows returned. It also has some extraordinary memory management options. Through the product's Dynamic Data Access (DDA) options, you can determine where the results of a report query are stored by default. Four options are available: client memory, client disk, server, and automatic. (The automatic setting determines how best to use available resources.) In order to access data more quickly, you can limit the amount of data transferred when a query is executed. The rest of the result set is transferred and displayed as needed.

ReportSmith comes with a pair of companion programs that make the product useful in distributing reports to end users and abstracting database design. The Data Dictionary, an element new to ReportSmith in Version 2.5, lets you assign custom views, aliases, and headings to table and field names. You can then attach these elements to named connections. Whenever someone else starts to create a report based on one of these connections, they see only the user-friendly views and aliases you've defined. But ReportSmith's Data Dictionary, while useful, is not as complete as the uni-

Suitability to Task: SQL Query and Reporting Tools

What sort of user are query and reporting tools really aimed at? Anyone from business-savvy SQL illiterates to users trained in the intricacies of relational database theory. In rating suitability to task, we look at the products from both of these user perspectives—as well as from the perspective of the DBA who plans to deploy these tools for all types of users.

Query and analysis In this category, we rate the power, ease of use, and above all, the accuracy of the query system. Does it provide a productive and flexible interface for generating SQL? Are complex query types well supported? Do they take advantage

of native database features? Is the generated SQL accessible and editable? Once the query is returned, are flexible browsing options provided? Does the product offer drill-down or other significant ad hoc analysis features? We also look to see whether the tool can provide a useful business-oriented abstraction of the underlying relational database. Products that do not demand extensive database knowledge earn extra points.

Connectivity Is a good selection of native and ODBC drivers included with the package? Does the product make good use of the client/server architecture and available server functions?

Reporting This category rates the product's report-writing and charting abilities. Does the product

SUITABILITY TO TASK

Product Name	
Query and analysis	Excellent
Connectivity	Good
Reporting	Fair
Setup and administration	Poor

support a wide range of simple and complex report types? Does the report writer have an intuitive, clear way to format data? The ability to access live data at design time is a plus. Are wizard-style tools available, and do they contribute significantly to the report-writing process? Is charting supported? Can charts be integrated into reports?

Setup and administration Here, we rate the power and flexibility of administration features. How intuitive are the administration tools? Can you easily control users' access to database resources? Can you effectively shield users from the physical database design and promote query safety? Can you add custom help systems? Can custom reports be easily developed and distributed?

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The perfect office would have no politics.

ponents such as a spell checker, thesaurus, grammar checker and file manager. Which saves system requirements. (Something else PerfectOffice does better than Microsoft Office.)

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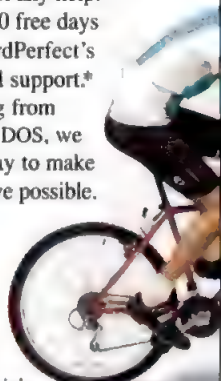
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SQL Query and Reporting Tools

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Borland ReportSmith for Windows 2.5

List price: \$99.95; upgrade, \$49.95. **Requires:** 386-based processor or better, 4MB RAM, 12MB hard disk space, Windows 3.1 or later. **In short:** ReportSmith is a comprehensive tool for creating reports for just about any database. A generous supply

of database drivers and a true WYSIWYG interface that lets you work with live data combine to make this a powerful report writer. However, the product lacks an integrated charting engine.

Borland International Inc., 100 Borland Way, Scotts Valley, CA 95066-3249; 800-408-0001, 408-431-1000, fax, 408-431-4122

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verses in BusinessObjects. For instance, you cannot specify joins or use spaces in alias names.

The other element that ties ReportSmith together with end users is the royalty-free runtime version that comes in the box. ReportSmith also includes a fully functional macro language based on Softbridge's BASIC derivative. This macro language, the Data Dictionary, and the runtime version combine to offer a flexible way to distribute just about any type of report.

Except for the lack of charting and its relatively limited ability to simplify the database for novices, ReportSmith is a rock-solid tool that does what it is supposed to do very well: create high-quality reports.

Business Objects Inc.

BusinessObjects

BY STEPHEN W. PLAIN

BusinessObjects 3.1 abstracts the inner complexities of relational databases more successfully than does any other product in this roundup. However, it also requires commitment to a two-tier manager/user style of database administration, and it's expensive: The manager module, which is necessary for setup, sells for \$3,495, and each user module costs \$595. Pricing aside, BusinessObjects provides a robust cross-platform solution that allows end users with no specific database knowledge to access data in a natural way.

Unlike most of the other products we

reviewed, BusinessObjects does not allow you to jump right in. An administrator must first use the manager module to create abstracted views of data called *universes*, then grant users access to certain universes by way of a user directory. Password security is also maintained.

QUERIES AND REPORTS

The BusinessObjects query builder couldn't be easier to use. It relies on a basic dialog that lets you define conditions, result objects, and sorts. As in Q+E, selecting a section brings up a dialog to specify objects and expressions. The end user can also create Macro Objects—custom objects defined as expressions based on previously defined objects.

BusinessObjects' weak point is its reporting. All reports are essentially tabular, so free-form designs are difficult to create. There is no crosstab support, though crosstabs are available through a \$295 add-in called BusinessAnalyzer. Though BusinessAnalyzer works well, crosstab support should be built in, considering the price of the base package. BusinessObjects lets you create reports and charts with a single toolbar click but lacks the formatting flexibility that other products have.

ADMINISTERING A UNIVERSE

The BusinessObjects database administrator creates a universe by designing classes

and objects. By default, BusinessObjects suggests the table names as classes and their column names as objects. While this is a necessary place to start, the power of BusinessObjects lies in its ability to abstract entire SQL Select statements as

SUITABILITY TO TASK**BusinessObjects**

Query and analysis	Good
Connectivity	Fair
Reporting	Fair
Setup and administration	Excellent

named objects. The goal is to create objects that have a direct correlation to terms with which the end user is familiar. If a particular calculation—such as Profits—is frequently required for queries, the database administrator can create a Profit object based on a Select statement that refers to several tables. This object can be used in queries as if it were a single column.

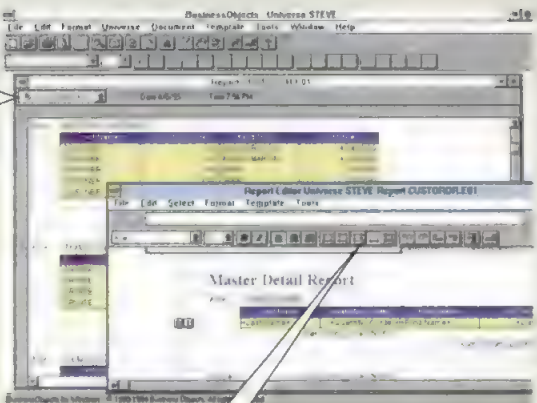
The database administrator must create enough objects to allow the user flexibility in designing queries. The Object dialog lets the database administrator design and modify objects by creating Select statements. This can be done either by typing the SQL in or through a simple expression builder that lets you pick from lists of tables, columns, operators, and functions. By defining Classes, a database administrator can step away from the structure of the database and organize objects according to department-specific categories.

The database administrator is also responsible for establishing joins and, if needed, alternative sets of joins called *contexts*. This is done by using similar types of dialogs to create classes and objects; the program will also suggest joins

BUSINESSOBJECTS

■ When a query is executed, the results are returned to the workstation and stored locally, eliminating the need to access the network again

■ BusinessObjects does a good job of creating default reports for a query but is limited to tabular-style reports. Crosstabs are available only through an optional module



■ You can modify default reports in the Report Editor. Here you can define new break groups, sort orders, and text formatting. The Report Editor is useful but not as intuitive as report writer products



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SQL Query and Reporting Tools

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BusinessObjects 3.1



List price: \$3,495 plus \$595 per user; BusinessAnalyzer, \$295; Batch module for Unix, \$150; Procedures module, \$150.

Requires: 4MB RAM, 10MB available disk space, Windows 3.1 or later

In short: BusinessObjects

provides the ultimate in data abstraction, but at a steep price. The product uses a two-tier approach that enables managers to deploy custom-tailored views of enterprise data. Though BusinessObjects has powerful deployment features, it falls short in reporting.

Business Objects Inc., 20813 Stevens Creek Blvd., #100, Cupertino, CA 95014; 800-973-1813, 408-973-9300; fax, 408-973-1057

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based on like column names. Since the end user will be creating queries, it is possible for two tables to be connected in more than one way (BusinessObjects calls this a *loop*). If the database administrator sets up contexts for these tables, the user will be prompted with user-friendly choices should the query builder detect a loop.

BusinessObjects makes excellent use of the client/server architecture to off-load repetitive operations to the workstation, minimizing network traffic. Queries, reports, and graphs created by users are stored locally. When a query executes, the result set is also stored locally in an ASCII file so that the user can continue to work with the data without connecting again to the server.

BusinessObjects' repository is a set of relational tables on the server that store the definitions of universes, classes, objects, and queries. The communication between a user's local workstation and repository is fairly sophisticated. When a database administrator creates a universe, it is stored locally then exported to the repository where it is available to users. Universe and query definitions are updated transparently when users log on. This underlying version control system, which greatly simplifies enterprise deployment, is one of BusinessObjects' major selling points.

CONNECTIONS

BusinessObjects works with a number of major SQL databases, including Oracle, Sybase, Microsoft SQL Server, Rdb, In-

formix, and DB2. Except for DB2, which is accessed through a gateway, each SQL driver is a native one. There is also an ODBC connection, but the company does not ensure its compatibility with various database sources and does not encourage its use as a primary connection.

Although BusinessObjects stores copies of universes and individual query object definitions locally, it does not have a local database engine. This means that developers must be connected to a relational database in order to build universes and that users cannot work offline (or on the road) with local data or copies of enterprise data. An ODBC configuration could theoretically provide access to a third-party local database, but since most installations will have purchased a native connection (only one connection is included with each package), you will not ordinarily have this option.

OTHER MODULES

BusinessObjects is also available in Unix (Motif) and Macintosh flavors; all versions of the product can access the same repository. Other components are also available: the Batch module for Unix (\$150) enables scheduled queries, and the Procedures module (\$150) provides programmability.

BusinessObjects is an impressive intermediary between data and users, delivering a smooth and natural querying interface custom-tailored to each user. But although it presents an innovative tool for implementing a structured system, it is overpriced for the PC platform and weak in reporting.

Crystal, a Seagate Software Company

Crystal Reports Professional

BY JAMES L. EOFF

If you use Microsoft Visual Basic or one of several other database development tools, you may be already familiar with the scaled-down version of Crystal Reports bundled with those products. Crystal Reports Professional 4.0 goes well beyond these OEM bundles. It improves on earlier Crystal Reports Professional releases with important new features such

as drill-down data analysis and Expert help modules.

Crystal Reports assumes a fair amount of administrator involvement in setting up its Crystal Dictionaries, which are used to abstract and simplify relational database structures to end users. But it also assumes a fair degree of knowledge on the user's part. More fundamentally, Crystal Reports remains geared more toward report writing than toward data browsing and ad hoc analysis. It is designed to be read-only with respect to the data source and has no abilities to administer databases directly. It currently ships with support for ODBC, IDAPI, and Q+E drivers for several popular databases including DB2/2, Oracle, and Sybase.

FLAT-FILE LEGACY

Crystal Reports was originally built to work with flat-file data such as .DBF tables or standard text files. This legacy shows in the way it retrieves data from client/server databases. All data relevant to an entire report is requested at once from the server by a fairly basic SQL query. The result set is then cached on the client's local drive, where it is manipulated like a flat file.

The package does not support common SQL aggregate functions such as Sum, Average, Min, or Max, which could greatly reduce the amount of network traffic generated. Very large data sets may be needed for some tasks, and you'll need a local hard disk large enough to

▶ FACT FILE

Crystal Reports Professional 4.0



List price: \$395; upgrade, \$199

Requires: 4MB RAM (8MB recommended), 22MB hard disk space, Windows 3.1 or later

In short: Crystal Reports remains fundamentally a data-printing rather than a data-viewing and analysis tool, but the latest

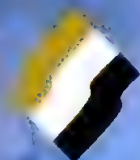
version offers some powerful drill-down reporting capabilities. It requires administration setup and a relatively sophisticated user, but can be a good choice where reporting tasks outnumber analysis sessions.

Crystal, a Seagate Software Company, 1050 West Pender St., 4th Floor, Suite 2200, Vancouver, Canada V6E 3S7, 604-681-3435, fax, 604-681-2934.

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Cache is great — that is when you can find it on a portable — because it gives you a superior performance. Our Liberty DX4-100 includes 256K L2 cache on an accelerated local bus yielding Pentium™-like performance. The ColorBook² includes 512K video cache for great video performance.

Hard Drive

Nothing less than a removable 340MB hard drive will do. In fact, you'll want the largest hard drive you can get. Microsoft® Windows™, DOS® and standard software applications automatically consume around 140MB at the time of purchase. All Liberty and ColorBook² PCs include at least a 340MB removable hard drive. The Liberty DX4-100 Best Buy and ColorBook² DX4-100 Best Buy both include a 720MB removable hard drive.

RAM (Random Access Memory)

A bare *minimum* of 8MB RAM is best — 4MB wasn't enough last year. To run Windows (and Windows 95) you'll need 8MB. 8MB will also increase your battery life and improve system performance. All Liberty and ColorBook² systems come standard with 8MB RAM and are expandable to 20MB or 24MB RAM.

Screen

When you're talking portables, you want the biggest, clearest display possible without adding weight or hiking up the price.

A good way to judge screens is to divide the screen size of the portable by its weight. The higher the ratio the better. The Liberty has an incomparable screen size-to-weight ratio of 2.44. This 10.4-inch screen also gives you 23 percent more active viewing area than a 9.4-inch screen and 53 percent more than an 8.4-inch screen.

The Liberty's 10.4-inch and ColorBook²'s 10.3-inch screens give you the best value available in a color display. With vivid colors and bright, clear screens, you'll forget you're working on a portable PC.

Size and Weight

It's a portable PC — the smaller and the less it weighs, the better! The Liberty and ColorBook² emerge favorably in both areas.

Batteries

Look for between three and four hours of battery life depending on the processor and RAM. Batteries based on nickel metal-hydrate (NiMH) or lithium ion will give you the best performance. The Liberty gives you up to four hours or more with power management. And it also allows for upgrading to a lithium ion battery.

Software

The better the included software applications, the more the value of your portable PC increases. Pre-installed on all Gateway portables is Microsoft Works for Windows 3.0 or MS Office Professional 4.3. The OAG® FlightDisk® and World Clock software is also included on all Gateway portables.

Keyboard & Pointing Device

You'll need a keyboard that's comfortable for you and that's also easy to use. The Liberty is equipped with a large palm rest, and flip-out feet so you can adjust the keyboard angle.

Pointing devices vary greatly. Again, find one that's easy for you to work with. Gateway's EZ Point™ integrated pointer is uniquely positioned to be comfortable and easily accessible.

Infrared Technology (IR)

Extras such as the Liberty's IR technology add even more value to your portable PC. With it you can take advantage of wireless file transfer — this means transferring files between the Liberty and your desktop (or between two Liberty PCs) without cables!

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Usability Testing: SQL Query and Reporting Tools

How We Tested

The reviewed tools were able to complete most of our tests. But the expertise that an end user would need to achieve our results in a real-world scenario varied widely from package to package.

Our tests of SQL query and reporting tools focused on data access, database connectivity, analysis, reporting, and administration features; we did not test query performance. Tests were conducted at PC Magazine Labs in New York; we invited each vendor to send technical representatives to work with the reviewers during the test cycle.

All products were tested against a SQL database running on a PC server in a networked client/server environment. The normalized database schema used for testing comprised seven tables: Customers, Salespeople, Products, Salesorders, Lineitems, Regions, and Territories. Each table contained a representative set of real-world data types, and the tables were populated with actual data consisting of 510 customers, 54 salespeople, 43 products, 10,000 sales orders, 25,000 line items, 8 regions, and 54 territories. Sales dates were spread over a 10-year period. Of the 500 customers, 10 did not have orders.

We preloaded the data onto the servers and created indexes before the start of testing. We did not define primary and foreign keys or referential integrity constraints.

Our test script covered five basic areas: data acquisition, analysis, reporting and charting, administrative functions, and e-mail, with each section containing several queries. Queries were specified in English rather than in SQL.

The data acquisition section posed relatively straightforward queries such as "list the top-selling and worst-selling products," "who are the 50 best customers?" and "what is the gross margin by product listed by month, quarter, or year?" Top-selling products were then listed by region for month, quarter or year.

The analysis section asked for more complex queries. Our sample prob-

lems included tracking upward and downward trends, searching for the most profitable territories, and finding the percentage of sales per salesperson based on overall sales. Vendors were also asked to create a drill-down query, starting with product sales listed by month or quarter, then drill down to individual product orders, and then down further to show specific sales-order details. A second drill-down query introduced a side step to look at salesperson totals for a product for the month or quarter.

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The reporting section of our test script required the creation of a series of standard reports including a crosstab report, a master/detail invoice, and mailing labels for a specific Avery laser-printer label format. We required that the master/detail report display a bitmapped company logo. The master/detail and the mailing label reports were subsequently printed on an HP LaserJet III.

We also required vendors to create two charts. The first was a simple line chart, showing gross profits for the past year by monthly sales. The graphs included a standard configuration of titles, labels, keys and a footnote. We also required an overlay graph showing the top five products sold per month as a bar chart with a line chart of the net profit for each month.

To test administrative functions, we asked the vendor to create views or objects of salespeople and customers by region in order to give end users a more intuitive look at the raw data. We also looked at available security and database governor features. Vendors were free to demonstrate any other database abstraction features their products offered. Finally, to test mail-enabled packages, we asked vendors to select a moderate-sized report and mail it from their product to a user's mailbox.

Vendors were given a choice between two PC-based SQL databases servers: Oracle7, Version 7.0.16, running under Novell NetWare 3.12 on a 66-MHz dual-processor HP NetServer 5/66 LM2; or Microsoft SQL Server, Version 4.21, running under Microsoft Windows NT 3.5 on an HP Vectra XU 5/90c.

The client test platform was a Compaq Deskpro 486/66M with 16MB RAM, a 340MB drive, and 800-by-600 video display capability. As a client operating system, vendors were allowed to specify either Microsoft Windows for Workgroups 3.11, MS-DOS 6.2, or IBM's OS/2 Warp 3.0, all using a FAT file system. On the Windows for Workgroups clients, we enabled Mail with post office (for use in conjunction with Microsoft SQL Server only).

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End users can be shielded from complex database structures to some extent through an administration feature called Crystal Dictionaries. These let you create simplified views of the database that

include predefined joins, English aliases for column names, and logical tables that group together multiple normalized tables. You can also add pop-up help texts to column headings. While the degree of abstraction offered is not very high, these dictionaries can

help reasonably sophisticated users past the worst hurdles. They do not let administrators limit access to data or govern the resources a single user can tie up, however. The Crystal Dictionary admin-

istrative interface is not as polished as that of the report writer and lacks the latter's graphical database join tool.

EASILY MANIPULATED

Bringing an entire data set to the client runs counter to basic client/server principles since it essentially turns your database server into a file server. But the advantage is that once you have received all the required base data, you can store it within a report and manipulate it off-line.

Crystal Reports makes it particularly easy to create drill-down reports. In fact, any report that summarizes data is a drill-down report by default. Since Crystal Reports normally gathers all the relevant data and then hides the details that you don't wish to display, drilling down to the

SUITABILITY TO TASK

Crystal Reports Professional

Query and analysis	Good
Connectivity	Fair
Reporting	Excellent
Setup and administration	Fair

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Once a report has been created, it can be compiled into an executable file and distributed. When the compiled report is run, it prompts you to fill in any missing parameters. To help you create and distribute compiled reports, Crystal Reports includes a Distribution Expert that guides you through the process and packages the report with all the required libraries. MAPI and VIM support make it possible to send

The report writer itself is simple to use and offers all the expected bells and whistles. You can edit using either live data or work in a preview mode, something which can be especially helpful for very large data sets. The report writer provides an extensive list of over 100 built-in formulas for data manipulation. While these will satisfy most users, C or C++ programmers can extend the list by adding custom DLLs. Crystal also allows royalty-free distribution of its print-engine DLL and supplies a VBX custom control, as well as an OLE custom control for developers who want to add reporting to their applications.

Crystal Reports boasts some strong points for ad hoc analysis but remains fundamentally a data-printing tool rather than a data-viewing tool. Its best feature is its efficient report writer, which is chock full of data-manipulation formulas, and it offers considerable strengths as a report development package. If your end users do lots of reporting, less analysis, and they are reasonably database savvy—and if you don't mind large client-cached data sets—Crystal Reports is a worthy contender.

SUITABILITY TO TASK	
Esperant	
Query and analysis	Fair
Connectivity	Excellent
Reporting	Good
Setup and administration	Good

Good The current release, which is Esperant's first despite the 2.x version number, works just well enough to convince us of its huge potential, but it doesn't work well enough to recommend. It was riddled with small bugs that would baffle end users, and it was not able to complete more than a few items in our test script without manual tweaks to the SQL or a switch to a different test server. It also lacks drill-down analysis features. Software AG plans to release Version 3.0 by the time this article appears. Although Version 2.1 proved far from ready for prime time, Version 3.0 is clearly a tool to watch.

The Administration system contains the tools to build Esperant DataViews, which abstract and manage the end users'

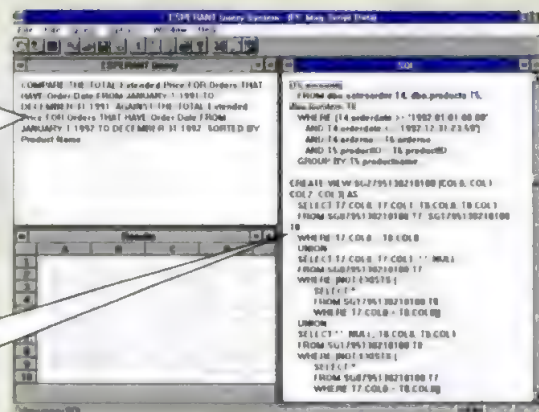
- Creating drill-down reports is particularly easy. In fact, any report that summarizes data is a drill-down report by default since the product gathers all the relevant data and then hides the details

ESPERANT

■ Esperant's SQL Expert technology represents a major step toward report writers that understand plain English. It takes simple English-like syntax

■ ... and converts it into complex, database-specific SQL statements. Ideally, it prohibits queries that yield incorrect or misleading results, but we found it can also prevent some legal moves

■ While the product we reviewed is clearly not ready for the limelight, the coming release holds great promise



view of the data. Setting up a DataView involves entering information on all tables, columns, primary keys, foreign keys, and the relationships between each table. The somewhat Spartan interface consists of several generic tables that let you enter information on alternative join paths, column aliases, computed columns, or create help texts.

Creating DataViews can be a difficult and time-consuming endeavor. The Auto-Build feature helps by letting you import table and column names directly from the database. For Oracle or Watcom databases, Esperant can import primary and foreign key information. Even so,

you'll need extensive knowledge of your database's design in order to create effective DataViews that yield correct results in the Query system.

The Administration system also lets you control the end users' ability to access information from the server and control the resources your users can tie up. You can force users to use the Query system exclusively; you can also restrict access to Query system menu items, limit the maximum size of a result set, or limit the execution time a single query may take.

MIXED SUCCESS

Once you've completed the DataViews, end users can begin using the Query system to generate results. Assuming you have granted them full rights, end users have three available query options: traditional SQL statements, the English-like Esperant language, or the point-and-click Query Assistant interface.

When they use the Esperant language of the Query Assistant, the SQL Expert uses DataView information to prohibit queries that yield incorrect or misleading results. The current implementation of the SQL Expert offered only mixed success in this regard, however.

In testing we found that Esperant did indeed prevent us from making several bogus queries, but it also kept us from selecting several actions which would have been perfectly legal. (Overall, Esperant seemed to err on the conservative side

whenever deciding what should be allowed or restricted.) In another case, Esperant correctly determined that the query we had requested could not be performed legally, but instead of informing us of this fact, it merely rewrote the SQL. This gave us a correct result, but not to the query as originally posed.

IMPRESSIVE SQL

Despite its problems, Esperant was able to create some very impressive SQL. Using the Query Assistant, we easily created comparison queries on similar data sets from two different periods of time. To do this, Esperant had to generate the necessary views dynamically and then create a union to give the results. The Query Assistant was also able to generate correlated nested queries when required in our tests. Writing complex queries such as these from scratch is well beyond the abilities, but not beyond the needs, of the average user.

Unfortunately, we also had to modify the generated SQL by hand several times in order to correct minor mistakes. These ranged from extraneous parentheses in the SQL to incorrect identification of available server functions. Such errors could stop SQL-illiterate business users cold.

Esperant's capable Reporter module was able to produce most of the reports we required. It also includes a wizard-like feature called Helping Hand, though if you choose to work from scratch instead, there are several tools available to quickly place your fields and format your report.

The crosstab tool on the Reporter toolbar gives you the unique ability to place a crosstab object anywhere on the report instead of requiring that the entire report be a crosstab. This makes it possible to have a single report where one crosstab represents the entire data set while other subsections represent a subset of that data. A charting tool is not available.

The potential of Esperant's SQL Expert technology is enormous and represents a major step toward report writers that understand plain English. The product we reviewed is clearly not ready for the limelight, but the coming release holds great promise.

FACT FILE

Esperant 2.1

List price: \$595 **Requires:** 386-based processor or better, 8MB RAM, 7.5MB hard disk space, VGA monitor or better, Windows 3.1 or later **In short:** Although Esperant is not yet ready for the limelight, its SQL Expert technology gives non-

technical end users an English-language query system and enforces safe SQL through an administrator-created abstraction layer. But numerous problems surfaced in testing. Keep an eye on this tool, but wait for the next release, which should be out by the time you read this.

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SUMMARY OF FEATURES

SQL Query and Reporting Tools



■ YES ■ NO

Products listed in alphabetical order

	Borland ReportSmith for Windows 2.5	Business- Objects 3.1	Crystal Reports Professional 4.0	Esperant 2.1	InfoMaker for Windows 4.0	Intersolv Q+E 6.1	Visualizer for OS/2 1.11 ¹
List price	\$99.95	Manager, \$3,495.00; User, \$595.00	\$395.00	\$595.00	\$249.00	\$499.00	Query, \$199.00; Charts, \$75.00; Plans, \$250.00
Query Builder							
Graphical query builder	■	■	■	■	■	■	■
Wizards or Experts	■	■	■	■	■	■	■
Queries are English-based	■	■	■	■	■	■	■
Queries can be executed on the client/server	■	■	■	■	■	■	■
User can limit query time/size of return set	■	■	■	■	■	■	■
User must know literal table and column names	■	■	■	■	■	■	■
Prompts join criteria/User must specify joins	■	■	■	■	■	■	■
Supports outer joins/nested queries	■	■	■	■	■	■	■
User can choose site of sorting (client or server)	■	■	■	■	■	■	■
SQL is validated before query execution	■	■	■	N/A*	■	■	■
Context-sensitive help/SQL language help/Tool tips on menus	■	■	■	■	■	■	■
Alerts user to common errors, such as Cartesian product	■	■	■	■	■	■	■
Automatic SQL generation	■	■	■	■	■	■	■
Generated SQL can be viewed/edited	■	■	■	■	■	■	■
Computed columns can be on client/server	■	■	■	■	■	■	■
Result set can be larger than clients' memory/disk space	■	■	■	■	■	■	■
User can cancel long-running queries	■	■	■	■	■	■	■
User can update server data	■	■	■	■	■	■	■
Automation and Communication							
Can export to Excel/Lotus/CSV	■	■	■	■	■	■	■
DDE support	■	■	■	■	■	■	■
Integrated VIM mail/MAPI mail	■	■	■	■	■	■	■
Macro language/Recorder	■	Both optional	■	■	■	■	■
OLE 2.0 support for client/server	■	■	■	■	■	■	N/A**
Reporting							
Types of reports:							
Crosstab	■	Optional	■	■	■	■	■
Master/detail	■	■	■	■	■	■	■
Multiple-query	■	■	■	■	■	■	■
Pivot table	■	■	■	■	■	■	■
Standard mailing labels	■	■	■	■	■	■	■
Two-pass	■	■	■	■	■	■	■
Report templates	■	■	■	■	■	■	■
Integrated charting/Wizard or Expert chart builder	■	■	■	■	■	■	■
BLOBs (Binary Large Objects) support	■	■	■	■	■	■	■
Bar coding/Avery label support	■	■	■	■	■	■	■
Conditional text formatting	■	■	■	■	■	■	■
User can use live data during report design	■	■	■	■	■	■	■
Multiple views of the same data	■	■	■	■	■	■	■
Report scheduling/Royalty-free report distribution	■	Optional	■	■	■	■	■
SQL Database Support							
DB2	■	(via ODBC)	■	■	■	(via ODBC)	■
IDAPI	■	■	■	■	■	■	■
Microsoft SQL Server	■	■	■	■	■	(via ODBC)	■
ODBC	■	■	■	■	■	■	■
Oracle7	■	■	■	■	■	(via ODBC)	■
Sybase 10	■	■	■	■	■	(via ODBC)	■
PC Database Support							
Access	■	■	■	(via ODBC)	■	(via ODBC)	■
Btrieve	■	■	■	(via ODBC)	■	(via ODBC)	■
.DBF	■	(via ODBC)	■	(via ODBC)	■	(via ODBC)	■
Paradox	■	(via ODBC)	■	(via ODBC)	■	(via ODBC)	■

N/A* Not applicable: Administrator defines the end user's options, so there is no need for validation. N/A** Not applicable: OS/2 does not support OLE.

¹ We tested only three of Visualizer's components; all seven are discussed in the product review.

Powersoft Corp.

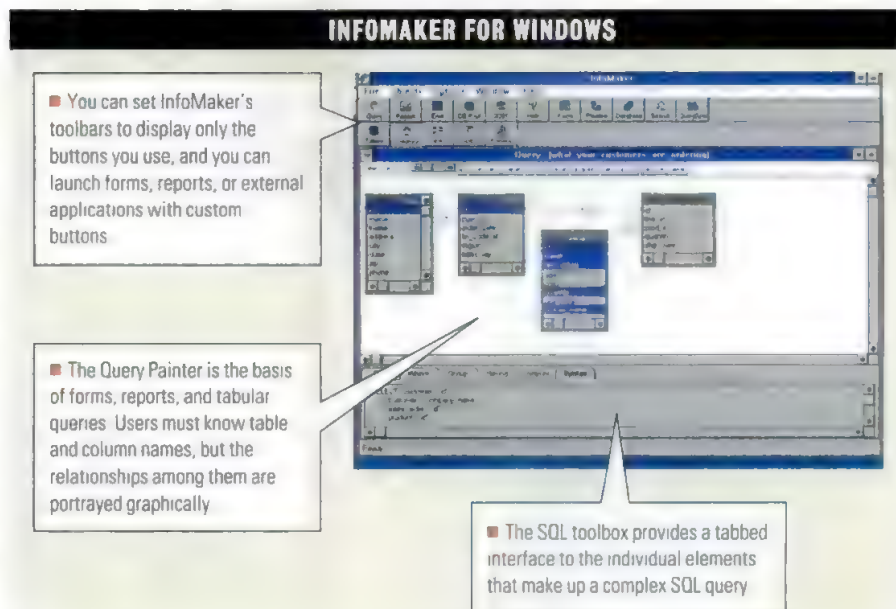
InfoMaker for Windows

BY STEPHEN W. PLAIN

InfoMaker for Windows 4.0 rolls together and replaces two products in Powersoft's Enterprise Series line: PowerViewer and PowerMaker. Because InfoMaker is also part of the company's successful PowerBuilder client/server development package, it uses the same query and report designers and has the same look and feel, though it lacks PowerBuilder's programmable features. Although InfoMaker (\$249) is billed as Powersoft's end user query and reporting tool, it is clearly geared toward users who have experience with relational databases and makes little effort to hide the complexities of database access. The product suffers from some stability problems, but it offers the SQL-savvy user some powerful administration tools and broad connectivity features that may make the product worth the occasional crash.

InfoMaker provides both read and write access to server data through queries, reports, and forms. The interface comprises a set of design windows called *painters*, all launched from the program's main toolbar: the PowerBar. You can easily customize the PowerBar by adding the icons for some or all painters and formatting operations and removing those you rarely need. You can also choose between large icons with text descriptions and smaller ones.

Painters, which have been hallmarks of PowerBuilder's interface for some



time, are easy to get used to. InfoMaker has six: Database, Environment, Form, Pipeline, Query, and Report. Each has its own customizable toolbar called a PainterBar.

SOME SQL REQUIRED

Although the Query Painter lets you point-and-click your way through query design, creating a query does require you to have some knowledge of SQL and the physical structure of your database. The Query Painter, which displays a graphical representation of the query, lets you drag-and-drop between columns to create joins based on primary/foreign key relationships and on matching column names. A tabbed dialog box on the same screen lets you view (but not edit) the generated SQL statement by its individual elements (Sort, Where, Group, and Having). Two additional tabs—Compute and Syntax—let you define computed columns and view but not edit the complete SQL statement.

Although the Query Painter lets you design complete, complex queries, you're usually better off creating queries in the Report Painter, which lets you call the same query design interface, then edit the SQL statement and format the data. The data source can be a new query, a stored query, a stored procedure on the server, or external data in a text file.

The Report Painter supports a number of formats: composite, crosstab, free-form, graph, grid, group, label, n-up, and tabular. A composite report can contain several nested reports. Graphs can be standalone reports or displayed within other reports. Mailing labels, a particularly strong point, are treated as a distinct report style and can be defined using standard Avery or custom formats. Unlike many competing packages, when you are formatting a report, InfoMaker lets you slide the fields left to space city and state values appropriately. You can also slide up the lines of the label if a particular line is blank.

DO YOU KNOW YOUR SERVER?

Creating complex reports requires knowledge of the functions supported only by the server. For example, InfoMaker supports computed fields in reports, but you cannot sort them; you must define the sort request in the query itself, which demands knowledge of server functions.

The Environment Painter gives a uniform look at all forms, reports, and queries. Collections of these elements are saved as library files with .PBL extensions. Using PowerBuilder, you can design style libraries as .PBL files containing custom form layouts that appear along with the standard form types when you build a new form. Icons for data pipeline

SUITABILITY TO TASK

InfoMaker for Windows

Query and analysis	Fair
Connectivity	Excellent
Reporting	Good
Setup and administration	Good

▶ FACT FILE

InfoMaker for Windows 4.0

List price: \$249 Requires: 386-based processor or better, 8MB RAM, 19MB hard disk space, Windows 3.1 or later.

In short: InfoMaker, which shares PowerBuilder's look and feel, is clearly geared toward users who have experience with relational databases. It makes little effort to hide the complexities of database access. It also suffers from some stability problems. Still, in the hands of the right user, its power and abilities make it worth the occasional crash.

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SQL Query and Reporting Tools

objects (data transfer operations you define in the Data Pipeline Painter) are also included.

The Data Pipeline Painter is an invaluable tool that lets you transfer data quickly between servers, post data from local tables to a remote server periodically, or move databases you've prototyped locally to a corporate server.

Although InfoMaker does not use the two-tier architecture found in products like BusinessObjects, it does offer some nice deployment functions. The Environment Painter lets you bundle forms and reports as a distributable application in a straightforward manner: Choose the elements you wish to include, assign custom help and toolbar icons, and create an .EXE file that can be run without InfoMaker. The executable file displays a simple toolbar with buttons for forms and reports, along with a complete set of standard menus. The Form Painter provides a good foundation for creating basic data-entry forms, complete with custom edit styles that let you enter data through radio buttons, check boxes, and drop-down list boxes. You can even choose a DropDown DataWindow style that will drop down a complete report you've designed for the user to browse when selecting a value for entry.

Despite its unassuming facade, InfoMaker is a useful tool for database administrators. It includes the Watcom SQL database engine, a full-fledged relational server that runs locally under Windows. The Watcom engine installs almost transparently and is an excellent data source for prototyping locally or for storing local tables in a production environment.

InfoMaker uses an ODBC driver to connect to the Watcom SQL engine but also includes a healthy set of both ODBC and native drivers. The product ships with 18 ODBC drivers, a mix of Microsoft and Intersolv versions, and 12 optimized native drivers called Powersoft Database Interfaces. The native drivers include all of the major SQL databases, such as Gupta SQLBase, Informix (Versions 4 and 5), Microsoft SQL Server, Oracle (Versions 6 and 7), and Sybase System 10.

InfoMaker does have its warts. We encountered numerous Windows application errors during a variety of operations. A free-form report, for example, contain-

ing a Select statement specifying only one table produced a general protection fault whenever we attempted to view it with more than 5,000 rows of data. Powersoft was working on a fix during our testing. (The company routinely posts bug fixes in the form of updated .DLL sets on CompuServe free of charge.) InfoMaker users should be prepared for similar bumps and be willing to maintain their code through regular updates.

InfoMaker is certainly not appropriate for users with no database knowledge. It assumes familiarity with the database structure and requires some database know-how to create complex reports. However, it does provide a good balance of rapid data access and administration flexibility for those in charge of supporting databases. It also offers an excellent introduction to the workings of the company's flagship PowerBuilder development system.

Intersolv Inc.

Intersolv Q+E

By STEPHEN W. PLAIN

If ad hoc querying of server or local data is your goal, Intersolv Q+E 6.1 is one of the most mature, straightforward, and well-connected tools around. Bundled with the company's broad selection of ODBC database drivers, it handles the basics of data access well, although it lacks the reporting niceties of more specialized

tools. Q+E assumes a savvy end user, however. If you don't know your data, you won't get far.

QUERY WINDOW

All operations in Intersolv Q+E revolve around the Query Window. This is a spreadsheet-like grid that displays the requested data whether you open data files directly or retrieve them with a query. Here, you can freely move and resize columns; you can also apply sorts, break groups, and conditions. Q+E lets you attach one report, form, and chart to each query through a series of design screens. Unlike products that treat reports and forms as standalone entities, Q+E treats them as views of a query. Therefore, if more than one report is based on the same data, a separate query must be defined for each.

Q+E provides a basic set of chart and report formats that can be attached to query definitions. Reports can be tabular, mailing label, form letter, or free-form; however, there is no support for crosstabs. Whichever style you select, the Report Builder interface is similar: The differences lie primarily in the default layout. The Chart Builder offers the standard selection of 2-D and 3-D chart styles created with a step-by-step Wizard (there is no

SUITABILITY TO TASK

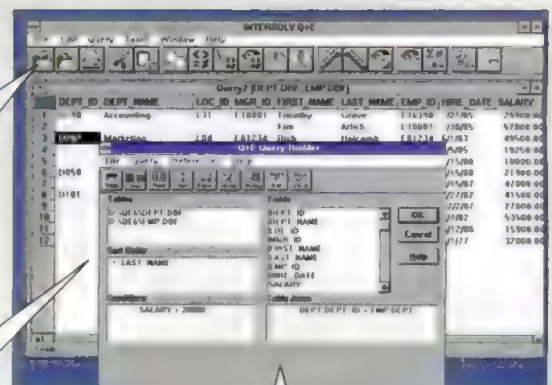
Intersolv Q+E

Query and analysis	Good
Connectivity	Excellent
Reporting	Fair
Setup and administration	Good

INTERSOV Q+E

■ Q+E's toolbar can be fully customized. Each button represents an associated macro, and you can define your own

■ Joins can be established through the Query Builder or by creating Visual Joins. Here, the DEPT and EMP tables have been joined and are shown as a single table



■ The Query Builder requires that you know your database structure, but it is very easy to use. Clicking in the areas designated Tables, Fields, Sort Orders, Conditions, and Table Joins brings up the appropriate point-and-click dialog

Most of today's client/server development tools force your applications to be driven by the outward appearance of things.

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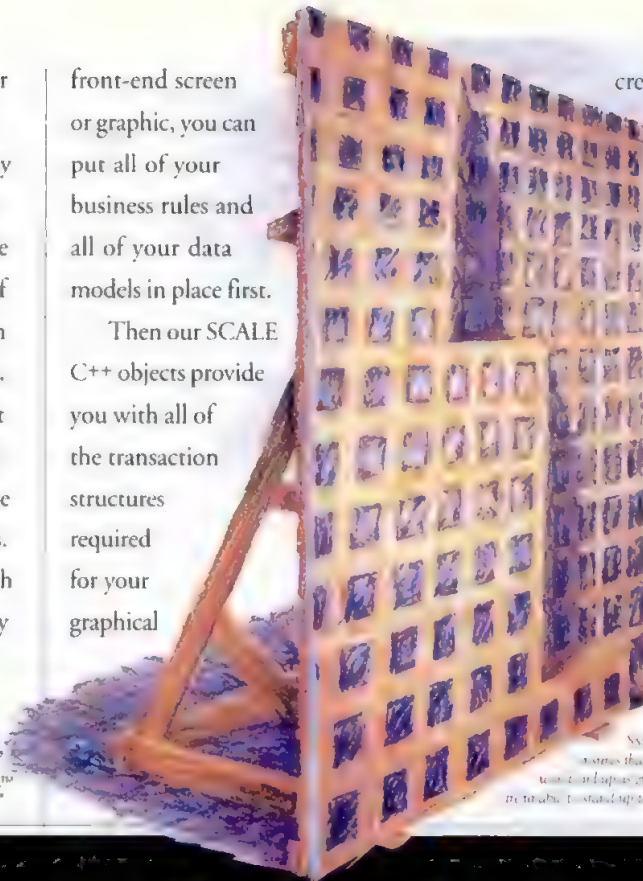
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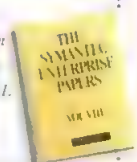
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SQL Query and Reporting Tools

corresponding reporting Wizard). Although charts are built separately from reports, you do have the ability to embed a chart within a report. However, the chart must be created before the report. This slightly awkward arrangement, coupled with the fact you can assign only a single report and chart to a query, is Q+E's weakest spot.

POINT AND CLICK QUERIES

The Query Builder dialog provides a point-and-click interface for building new queries. The dialog comprises five sections: Tables, Fields, Sort Orders, Conditions, and Table Joins. The toolbar in the Query Builder includes buttons for these functions, as well as others for setting groupings, establishing Having By statements, editing the generated SQL statement directly, and checking its syntax. The process of building a query in Q+E is straightforward assuming you know the structure of the data source, and it remains consistent regardless of the type of data source you connect to.

Queries do not have to be created through this interface, however. By opening the tables directly in the Query Window and establishing conditions, joins, and so forth, you can create the same query without dealing with the components of a traditional SQL statement. The query is automatically updated as you make changes and is always available in the Query Builder for modification.

Although the Query Window serves as a generally useful way to work with data directly, it has a couple of minor usability

problems. As you apply new sorts to the data, the Order By clause is automatically updated, with the new sort added to the previous one. Unless you remove the sorts first, you can end up with quite inefficient clauses. Another quirk is that you cannot drag a column past visible positions on the screen, making it hard to move a column from last to first if the data set exceeds the width of the window. These quibbles aside, Q+E is useful for data entry as well as retrieval since it provides both read and write access to your data.

Although Q+E is not positioned as a development tool, it provides various automation facilities, including a macro language that encompasses most of the product's menu and mouse operations. The language contains dozens of easily decipherable commands such as Save.Query, each documented in the on-line help. Flow-control structures such as For...Next or Loop are not included in the language, so each command must be executed sequentially. You can attach scripts to icons on the toolbar and to mouse events for each column in the Query Window. In addition, start-up scripts can be defined to launch when Q+E or a specific query is run.

Using event scripts, you can turn a basic view of your data into a fairly sophisticated data analysis session. Using the OPEN.QEF command, which opens a saved query, you can create drill-down functionality on specific columns to explode summary figures into their detail information. The value you click on is passed to the secondary query as a parameter.

Q+E also supports OLE 2.0 automation and exposes most of its functionality through OLE commands that closely parallel the scripting language. Through OLE automation, you can call Q+E queries from development tools such as Microsoft Visual Basic. Macro add-ins for Ami Pro, Excel, Quattro Pro, and Word for Windows are also provided in the box, allowing you to bring query results into a spreadsheet or word processor without battling with DDE commands.

The Form Builder is another useful part of Q+E. After you open a query or table, the Form Builder can create a default data-entry form complete with command buttons for record operations like New Record and Delete Record. A QBE

button lets you switch into a form-based query-by-example mode that will retrieve records matching the criteria you type into the fields. Q+E also includes a scheduler that can trigger scripts at a particular time or at scheduled intervals.

Intersolv Q+E provides effective access to a variety of data sources and offers a quick way to set up a data entry system. Although the product could use some enhancements to its reporting component, its excellent connectivity, ease of use, and varied automation features make it a powerful tool for the knowledgeable user.

IBM Corp.

Visualizer for OS/2

BY GABRIELLE GAGNON



Visualizer for OS/2 1.11 is a suite of sophisticated decision support packages that are simple enough for an end user to master yet powerful enough to solve real business problems. It can run ad hoc queries against relational databases and then combine, consolidate, and analyze the retrieved data using its own internal data structures—all for a fraction of the price of high-end data-mining tools like Arbor Software's Essbase, for example.

Visualizer lacks the speed you get from those more expensive packages, too, but for small- to medium-sized tables of a few thousand rows, Visualizer's speed is adequate, and its ability to construct complex queries quickly more than makes up for the time you have to wait for retrieval. Since it uses an intuitive, visual metaphor, even relative novices can perform multi-table joins and other relational operations without having to understand the intricacies of SQL. Users do not need extensive knowledge in order to create and execute successful queries and reports.

Visualizer comprises seven modules: Query, Charts, Plans, Development, Statistics, Procedures, and Ultimedia Query. The foundation of the package is Query, which you must buy in order to use any of the other modules. For our tests, we used only the first three modules. You can purchase the full-featured package for each user or create Visualizer applications using the Development

▶ FACT FILE

Intersolv Q+E 6.1

List price: \$499 **Requires:** 2MB RAM (4MB recommended), 12MB hard disk space, Windows 3.1 or later **In short:** Intersolv Q+E is a mature, straightforward, and well-connected tool for querying both server and local data sources. It assumes a

database-savvy user, however. The product's Form Builder lets you quickly set up a data-entry system; a scripting language and OLE provide good automation. More than 30 Q+E drivers are bundled. Weak points are a one-report-per-query limit and a lack of crosstab functionality.

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module (\$995) and distribute runtime versions royalty-free. Either way, you can distribute Visualizer from a central repository.

VISUALIZER QUERY

Visualizer Query (\$199) is a SQL query and report-writing package. Query selects data sources, creates tables and views, generates SQL queries, and produces columnar and crosstab reports. It contains Workplace Shell objects, including a database folder that contains all the database table and view objects visible to the current user; templates for Query objects (graphical representations), SQL statement objects (text only), and Report objects; utilities; and complete on-line documentation.

Since Visualizer is a Workplace Shell application, it makes extensive use of

drag-and-drop and DDE links between objects. To create a report, for example, you drag a report template to a work folder. You can then click on a

database table object and drag it to the report object you created to establish a link. When you open the report, Visualizer will automatically open the database, select all the records, and display them in a default report format—all without your having to write a line of SQL code. If you prefer, you can link a report to a SQL query object instead.

Constructing a SQL query is also done visually by dragging Table objects to a Query object and selecting from the list of available columns that pops up when the link is established. You can create nested queries by linking a series of Query objects. But despite its simple approach, Visualizer Query can produce the most complex SQL queries imaginable.

While Visualizer's querying capabilities were impressive, we found the report writer to be less sophisticated and not as easy to use. We couldn't combine charts or graphics with columnar reports, and customization entailed navigating through a maze of screens. However, the Quick Report facility—the OS/2 version of a report wizard—went a long way towards simplifying the process.

CHARTS AND OTHER MODULES

To produce charts, we used the Charts module (\$75). This package supplies business graph objects that run the gamut from simple line and bar charts to scatter and surface graphs, exploding pie charts, and color-coded, rotating 3-D charts.

You can show data relationships in stacked, overlapping, or side-by-side formats, and you can mix chart types as well as presentation styles within a single chart. Charts works with all the other Visualizer modules, so it can produce graphical representations of complex statistical analyses and multidimensional business models as well as simple database tables.

For more advanced decision-support needs, IBM supplies Statistics (\$250) and Plans (\$250). The Statistics module has a level of sophistication that sets Visualizer apart from other desktop query tools. It offers dozens of methods for analysis and forecasting grouped under the categories of exploratory methods, distributions, relations, quality control, model fitting, ANOVA variance analysis and tests.

The Plans module generates business models that allow users to examine different aspects of their business across multiple dimensions. These models are useful

for evaluating trends, especially when the trends are dependent on complex relationships. In our tests, for example, we compared the sales performance of various products over time for different geographical regions. While it was possible to do this using just SQL queries, we would

have had to run several queries and combine their results to get answers. Visualizer Plans achieved the same result using a single model. Plans also consolidates levels automatically and can summarize totals for both regular and irregular time intervals.

Features like these make Visualizer Plans an ideal data-mining tool.

Other modules include Procedures (\$125) and Ultimedia Query (\$270). Procedures lets you automate routine tasks with an iconic macro language. Ultimedia Query can query objects in a database based on selection criteria such as average color, texture, outline, and position.

Visualizer for OS/2 is the cross-platform successor to IBM's Personal Application System/2. It is currently available for OS/2 and AIX/6000, and Version 2.0 will support Windows 95. Although the initial release was confined to working with IBM products, Visualizer 1.11 provides read-only access to Microsoft SQL

The Statistics module has a level of sophistication that sets Visualizer apart from other desktop query tools.

SUITABILITY TO TASK

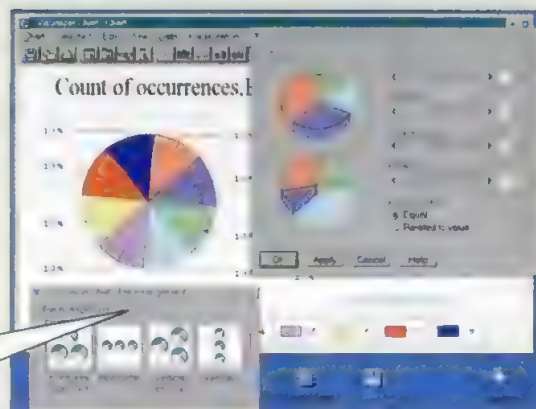
Visualizer for OS/2

Query and analysis	Excellent
Connectivity	Good
Reporting	Good
Setup and administration	Excellent

VISUALIZER FOR OS/2

Visualizer's Charts module can produce graphical representations of complex statistical analyses, multidimensional business models, and simple database tables

Charts also makes line and bar charts, pie charts, scatter and surface graphs, and color-coded rotating 3-D charts. You can embed several chart types in a single report and arrange them on the page



Visualizer for OS/2 is simple enough for end users to master yet powerful enough to solve real business problems.



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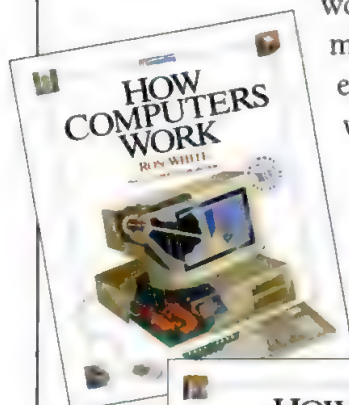
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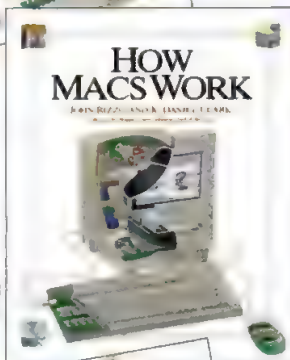
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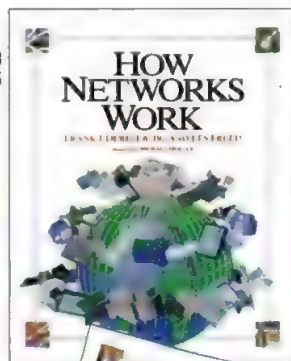


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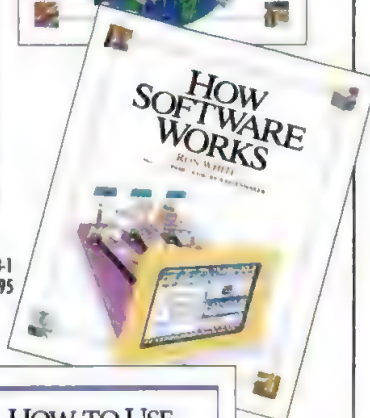
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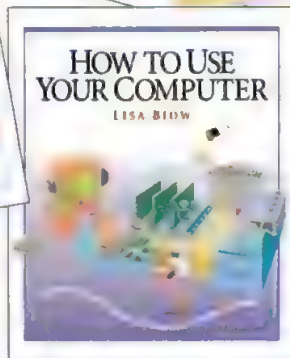
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APPLICATIONS DEVELOPMENT

SQL Query and Reporting Tools

Server, Oracle7, and Sybase SQL Server through Intersolv Q+E ODBC drivers. Read/write access is available only for IBM databases, but that restriction should be removed in the next release.

As before, Visualizer has direct con-

*Visualizer provides a
rich set of tools diverse
enough to meet the most
demanding decision-
support needs.*

nectivity to AS/400 and Host AS file systems as well as IBM DB/2 for OS/2, AIX, OS/400, MVS, VM, and VSE. You can also access SQL/400 and SQL/DS databases via a DDCS gateway. Support for user-defined data types (that is, objects) will be available when IBM releases DB2 W/S 2.0 this summer.

Altogether, the Visualizer suite provides a rich set of tools that are both easy for end users to learn and diverse enough to meet the most demanding decision support needs. □

► FACT FILE

Visualizer for OS/2 1.11



List price: Query, \$199; Charts, \$75; Plans, \$250; Statistics, \$250; Procedures, \$125; Ultra-media Query, \$270; Development, \$995 **Requirements:** 486-based processor or better, 16MB RAM, 20MB hard disk space, VGA monitor or better, OS/2 2.1

or later **In short:** A complete set of intuitive decision support tools. We completed our tests using only the Query, Charts, and Plans modules. Connectivity to all of IBM's relational databases plus access to IBM mainframes and AS/400 systems makes Visualizer particularly attractive to IBM shops, although it now also has ODBC access to Microsoft SQL Server, Sybase SQL Server, and Oracle7. Rich data modeling and analysis features despite less-than-zippy performance make this an ideal data mining tool for exploring small- to medium-sized databases.

IBM Corp., Warwick Software Development Laboratory, P.O. Box 31, Birmingham Rd., Warwick, UK CV34 5JL; in USA, 800-426-2225, ext. 137; in Canada, 800-465-1234, ext. 2002; elsewhere, +44-926-464845, fax, +44-926-499256

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BY NEIL J. RUBENKING

Organize Files Globally with File Manager

Suppose you want to erase all the .TMP files in any directory on your hard disk, or reorganize your hard disk so that all the .DOC files anywhere on your hard disk are moved into one directory. It's really very easy using the Windows File Manager. Here's how to put all of the .DOC files on your C: drive into a new directory:

- In File Manager, select the drive and directory into which you want to put the .DOC files.
- Choose File | Search and enter *.DOC in the Search For: line of the dialog box. Enter C:\ in the Start From: line and then check the Search All Subdirectories box. Now click on OK.
- The Search Results window will then display all of the .DOC files on the C: drive. Select these files by clicking the first file and then holding down the Shift key while clicking the last file.
- Hold down the Shift key and drag all of the files from the Search Results window to the Destination Directory window.

Using the File Manager's search command can make housekeeping extremely easy. You can also delete all the files that meet a specific condition anywhere on

your disk with this technique.

But what if you want to copy, move, or delete all files of a specific type from multiple drives? You can do it easily in Word for Windows 6.0. For example, to delete all the .BAK files on all drives, follow these steps:

- Choose File | Find File... and then click the Search button.
- In the Search dialog box, enter *.BAK on the File Name: line. On the Location: line, enter all your drives and separate them with semicolons (C:\;D:\, for example). Finally, check Include Subdirectories and press OK.
- Select any files you want in the Listed Files box by holding down the Ctrl key and clicking them.
- Click the Command button and choose Delete.

To move these files to a new location,

you'd use the Copy command first and then the Delete command.

Shawn Devenshire
Walnut Creek, California

► **PC MAGAZINE:** Yes, the Search Results window in File Manager is "live"—you can move, copy, delete, or perform just about any file action on the results. It's surprising how many Windows users don't realize this! As far as multi-disk searching goes, it's easy enough to repeat the action on each disk in your system, so don't feel left out if you don't own WinWord.

If you're running the Windows 95 beta, it's a snap to search multiple drives or directories. The Explorer (Windows 95's answer to File Manager) supports this feature the same way that WinWord does. You simply list the directories you want to search, separated by semicolons.

One warning: If you drag files without holding any shift keys, the files will be *moved* when the source and destination directories are on the same drive, *copied* when they're different. That's confusing! When dragging files to a new location, always hold down Shift when you want to move the files to the new location, Ctrl when you just want to make a copy.

Clean Up Your AUTOEXEC.BAT

My AUTOEXEC.BAT can get very messy, especially after I install a lot of software. It's hard to distinguish which lines are used by which applications, and it can be substantially slower to boot up when my AUTOEXEC loads a lot of needless junk.

Here's how I handle the problem. First I group relevant commands in my AUTOEXEC.BAT file into separate categories, and then I create a separate batch file for each category. I put all of these batch files into a directory called \AUTOEXEC. My AUTOEXEC.BAT now looks like this:

IN THIS SECTION	
Tutor 247	
Corporate Developer	255
Power Programming	261
Toolkits	259
Utilities	273
Solutions	283


```
@echo off
call \autoexec\set-env
call \autoexec\cache
call \autoexec\cdrom
call \autoexec\sound
call \autoexec\mouse
call \autoexec\network
```

The SET-ENV.BAT file sets environment variables, CACHE.BAT loads Share and SmartDrive, and so on. Not only is my AUTOEXEC more organized this way, I can easily comment out a set of programs when I want to disable them.

Henry Ho
Monterey Park, California

► **PC MAGAZINE:** A side benefit of splitting up your AUTOEXEC.BAT in this way is that you'll easily recognize any changes made by ill-behaved install programs. Any line other than @echo off and the six call lines is something imposed by an external program.

There is one disadvantage to splitting up your AUTOEXEC in this way, and that's the wasted disk space. Unless you

use disk compression software, an AUTOEXEC.BAT file split like this will use eight clusters of disk space rather than one (that's one cluster for each of seven batch files, plus one for the AUTOEXEC

```
@ECHO OFF
GOTO %1

:set-env
REM Environment variable SET commands here
GOTO End

:cache
REM Cache-related commands here
GOTO End

:cdrom
REM CD-ROM commands here
GOTO End

:sound
REM Sound-related commands here
GOTO End

:mouse
REM Mouse-related commands here
GOTO End

:network
REM Network commands here
GOTO End
:End
```

Figure 1: Use a batch file patterned after this one in conjunction with a simplified AUTO-EXEC.BAT to keep your boot process organized.

subdirectory). On a 200MB hard disk, for example, that translates to 28K of wasted space. If you use DoubleSpace, DriveSpace, or a version of Stacker earlier than 4.0, each file will occupy just one 512-byte sector, so you'll waste no more than 3.5K. And if you use Stacker 4.0, you'll have no wasted space.

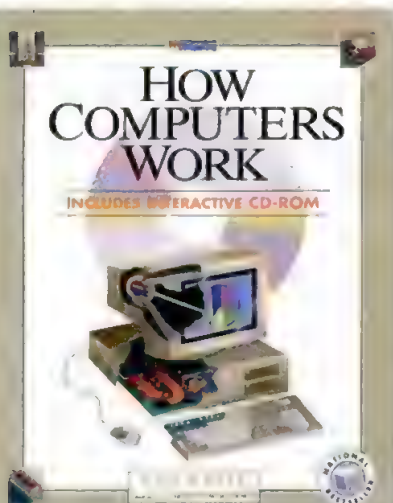
If disk space is an issue, try this variation. Instead of creating a special directory and multiple batch files, create one file called AUTOEXEK.BAT, patterned after Figure 1. Change the sample AUTOEXEC.BAT shown above to this:

```
@echo off
call autoexek set-env
call autoexek cache
call autoexek cdrom
call autoexek sound
call autoexek mouse
call autoexek network
```

This way you use just one extra file. As before, to disable one set of commands temporarily, you simply REM out the corresponding line and reboot. □

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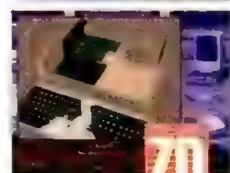
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Tutor

BY JEFF PROSISE

Is VFAT Ready for Prime Time?

By the time you read this, the mass-release beta 3 of Windows 95 should be in the hands of the general public. More than 300,000 computer users will be banging on the product, subjecting it to the rigors of everyday use, trying to break it, and reporting failures back to anxious developers at Microsoft. And those same 300,000-plus people will be using VFAT, the new file system supplied with Windows 95. VFAT, or *virtual file allocation table*, replaces FAT, the outdated file system used by DOS.

VFAT is both a blessing and a curse. It is a compromise designed to provide compatibility with existing FAT-formatted disks and an easy migration path from Windows 3.1 to Windows 95, while eliminating the FAT file system's most bothersome limitation: short filenames. VFAT filenames may contain up to 255 characters and may include mixed-case characters and spaces. A file containing 1995 third-quarter sales reports for Widget Corp.'s Midwest region can now be called "1995 Quarter 3 Sales Reports-Widget Corp.-Midwest Region" instead of WCQ3SALE.M95.

On the surface, it sounds pretty good. VFAT volumes are compatible with DOS, Windows 3.1, and Windows 95, and they support long filenames too. Old DOS and Windows applications—referred to as *legacy* applications by some—are still limited to 8.3 filenames (8 characters plus a 3-letter extension). VFAT automatically generates 8.3 aliases for long filenames so that a file can be accessed by any application, regardless of whether it's a DOS, Windows 3.1, or Windows 95 program. From a purely business standpoint, VFAT was the right choice

for Microsoft to make; compatibility is the number-one criterion for Windows 95's commercial success, and one can't fault VFAT for compatibility.

The downside is that VFAT inherits many of FAT's deficiencies. It doesn't deal efficiently with large disk volumes, for example, and it does next to nothing to protect the integrity of its files. The FAT file system was created more than 15 years ago to organize information on floppy disks. It was never intended to be used with today's high-capacity hard disks.

So how good is VFAT—really? How does it compare with more advanced file systems such as OS/2's HPFS (High Performance File System) and Windows NT's NTFS (NT File System)? Is it robust enough to carry the Windows platform into the year 2000 and beyond?

To answer these questions, we'll critically compare the VFAT system and NTFS, which is arguably the most advanced file system available for personal computers. We'll ignore the very high-end features of NTFS (such as fault tolerancing), which are primarily of interest on network servers, and focus instead on the benefits NTFS brings to end users. Then you can decide for yourself whether to commit to VFAT or demand a more sophisticated file system.

VFAT AT A GLANCE VFAT achieves 100-percent compatibility with FAT volumes by structuring disk volumes almost

exactly like FAT volumes. A *volume* is a logical entity that the operating system represents as a drive letter. A floppy disk contains a single disk volume, while a hard disk may be partitioned into several volumes. As shown in Figure 1, a VFAT volume is divided into four areas: the boot sector, the file allocation table(s), the root directory, and the data area.

The boot sector is the first physical sector in the volume. (A *sector* is the smallest possible unit of physical disk storage; one sector holds 512 bytes of data.) The boot sector contains the code for the bootstrap loader, a small program that executes when the computer is booted from this disk, beginning the process of loading the operating system into memory from elsewhere on the disk. The boot sector also contains a block of data holding information about the disk itself, such as the number of file allocation tables on the disk and the number of bytes per sector.

The file allocation table from which FAT and VFAT take their names is a data structure that serves as a road map to files stored on the disk. Most disks contain

Windows 95's VFAT is both a blessing and a curse: It eliminates the short filename limitation, but inherits many of FAT's deficiencies.

two identical copies of the FAT, so files can still be retrieved if a sector in the first FAT becomes unreadable. (RAM disks are the most common exception to the two-FAT rule; most contain just one FAT in order to conserve memory.) Files are stored in the disk's data area, where space is allocated in units

known as *clusters*. A cluster is one or more contiguous sectors; the number of sectors per cluster, which is stored in the volume's boot sector and is always a power of 2, depends on the size of the volume.

The FAT contains one 12- or 16-bit entry for every cluster in the data area. (12-bit FAT entries are used on floppy disks and hard disk volumes smaller than 16MB; all other volumes use 16-bit entries.) If a cluster does not contain any file data, its FAT entry is 0. When a cluster of disk space is allocated to hold a file's data, that cluster's FAT entry is marked with a nonzero number indicating that the clus-



Figure 1: The logical structure of a VFAT volume.

ter is in use. The number placed in the FAT entry isn't some arbitrary value, but the number of the next cluster in the sequence of clusters allocated to the file. If this is the final cluster in the chain, the FAT entry is marked with a special number indicating that there are no more entries for this file.

A by-product of this design is that a single file written to a FAT volume can occupy as little as one cluster or as much as the entire data area of the disk. Moreover, a file's clusters don't have to be located together, because the file's FAT entries form a linked list that unambiguously identifies where each cluster of the file is stored. The first FAT entry holds the cluster number of the second, the second FAT entry holds the cluster number of the third, and so on. If the file system knows a file's starting cluster number, it can find every cluster allocated to the file by following the chain of FAT entries until it reaches an end-of-chain marker. And the file system can easily find free space on the disk by scanning the FAT for zeros.

Each file on the volume is accompanied by a 32-byte directory entry that holds the file's name, starting cluster number, attributes (hidden, system, read-only, and so on), and size (in bytes), as well as the date and time the file was created or last updated. Directory entries for files located in the root directory are stored in the root directory area. Directory entries for files located in subdirectories are stored in the data area. A subdirectory is just like a file, except that the directory entry that identifies the subdirectory is marked with a special subdirectory attribute bit. The

"data" for a subdirectory is actually a series of 32-byte directory entries identifying the files (and possibly other subdirectories) stored inside it.

The primary difference between a FAT volume and a VFAT volume is what VFAT does to store long filenames. Because only 11 bytes of a file's 32-byte directory entry are set aside to store the filename, filenames cannot exceed 11 characters in length. This limitation could be overcome by lengthening directory entries to more than 32 bytes, but then VFAT volumes wouldn't be compatible with FAT volumes. So VFAT's designers devised an interesting alternative.

When you create a file on a VFAT volume, the VFAT driver writes two filenames to the disk. One is an 8.3 alias called the *short name*. The short name is generated from the long filename and stored in a conventional 32-byte directory entry. The long filename is spread among a series of specially formatted 32-byte directory entries that immediately precede the short filename directory entry. Entries

Volume size	Cluster size
16MB to 128MB	2K
128MB to 256MB	4K
256MB to 512MB	8K
512MB to 1GB	16K
1GB to 2GB	32K
2GB to 4GB	64K

Figure 2: Volume size versus cluster size for a FAT- or VFAT-formatted disk.

devoted to the long version of the filename store 13 filename characters each (each entry reserves 26 bytes for the filename, but since long filenames are stored in Unicode rather than ASCII format, each character requires 2 bytes of storage space), so the exact number of directory entries required depends on the length of the filename. Applications that use Win32 file I/O functions see files by their long names, but legacy applications (which would crash left and right if filenames suddenly expanded from 11 to 255 characters) see only the short names.

A key element in the design of this system is that long filename directory entries are marked with an unusual combination of attribute bits: hidden, system, read-only, and volume label. Through testing, Microsoft found that this protects long

filename directory entries from low-level disk utilities such as Norton Disk Doctor and even from DOS itself.

Thus, a user can create a file with a long filename using a Win32 application and still access that file from a DOS or Windows 3.1 application using the short name. Better yet, if a user copies a file with a long name to a floppy disk under Windows 95 and inserts the disk in a DOS PC, the file will be visible by its short filename. (The long filename will be invisible, because DOS ignores directory entries marked with hidden, system, read-only, and volume-label attributes.) But take the disk back to a PC running Windows 95 and the long filename is still there. Aside from the obvious difficulty of keeping short and long filenames in sync if both 16- and 32-bit applications are accessing the same disk volume, this solution is clever if not downright ingenious. But even under the best of circumstances—when the user runs Win32 applications exclusively—the file system as a whole is far from perfect.

One deficiency stems from the fact that the size of the root directory is set when the volume is formatted and cannot be changed without reformatting. This is not true of subdirectories, which can grow just like files. The majority of hard disks today are limited to 512 file and subdirectory names in the root directory, because the root directory area of the disk is 32 sectors (16K) in length. The fixed size of this area is even more constraining to the VFAT driver, because every file it creates requires at least two directory entries and usually more. Thus, you are much more likely to run out of space in the root directory with a VFAT volume than with a FAT volume. It has always been a good idea to limit the number of files you place in a hard disk's root directory, but the design of VFAT makes this downright imperative.

Another limitation is that FAT entry numbers are stored in 16 bits, which means there can be no more than about 65,500 of them. The cluster size is therefore driven by the volume size, as shown in Figure 2. A 100MB volume uses a quite reasonable cluster size of 2K, but a volume slightly greater than 1GB in length requires a 32K cluster size. No file on that volume can occupy less than 32K of disk space, even if that file is but 1 byte in

length. Large cluster sizes are okay if you store lots of large files and very few small ones, but most hard disks have a mix of large and small files, with the small files far outnumbering the large ones. For these drives, a large cluster size reduces storage efficiency. (In the next Tutor column, we'll explore the issue of cluster size versus storage efficiency in more detail.)

The direct link between volume size and cluster size has another adverse side effect. Although VFAT volumes can theoretically be extremely large, in practice they are limited to about 2GB because of the extraordinary cluster sizes required to support larger volumes. 2GB may seem like a lot today, but already 1GB hard disks are commonplace. Five years from now, 2GB won't seem nearly as large as it does now.

Yet another limitation is that directory entries are assigned on a first-come, first-served basis, and no indexing or sorting is performed. To locate a particular file, the file system driver performs a sequential search beginning with the directory's first entry. File search operations are fairly fast in directories containing a few dozen files, but they bog down when a directory grows to encompass hundreds or perhaps thousands of files. To speed searching and sorting, modern file systems such as NTFS and HPFS treat directory entries like records in a database.

THE NT FILE SYSTEM NTFS is entirely different from VFAT. Designed from the ground up for high performance, reliability, and security, NTFS handles large hard-disk volumes with ease (up to 68 billion terabytes) and never uses a cluster size greater than 4K. It supports long filenames and is scalable, so it works equally well on a network server holding mission-critical files and a standalone PC used for household gaming and budgeting.

The heart of an NTFS volume is a file called the Master File Table (MFT), which is actually a relational database file containing one or more file records for each file and directory on the disk. File records are 1K, 2K, or 4K in length and are subdivided into variable-length fields containing attributes. NTFS views a file as a collection of attributes. The filename is one attribute, its security descriptor (which specifies who owns the file and who can access it) is another, the file's data is yet another, and so on. When pos-

sible, a file's attributes are stored inside its file record—that is, in the MFT. Small files frequently require no separate allocation of disk space because everything about them, including their data, fits inside their file records.

When a file's attributes grow too large to be stored in the MFT, NTFS allocates one or more clusters of disk space called *runs* and stores the attributes there. Attributes stored outside the MFT are called *nonresident* attributes. The location of nonresident attribute data is recorded in the file record; given a file's 48-bit ID number, which is actually an index (starting with 0) into the MFT, NTFS can locate

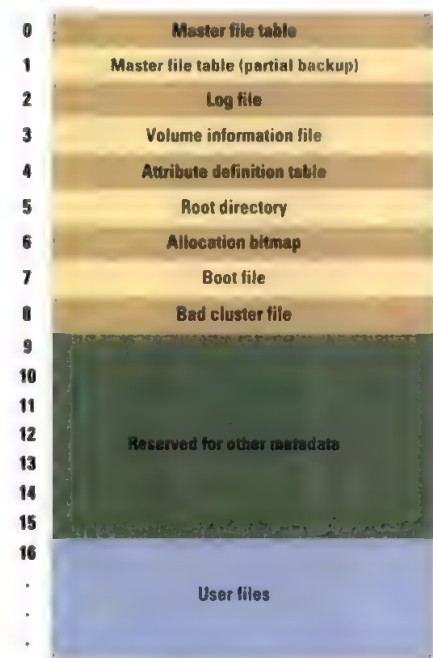


Figure 3: The first 16 records in the MFT are reserved for metadata files.

any and all parts of that file. Most files have just one file record in the MFT, but if necessary NTFS can allocate additional file records for a file. Thus, there is virtually no limit (besides available disk space) to the number of attributes a file can be assigned or to the size of those attributes.

The first 16 records in the MFT are reserved for system files known as *metadata* files, as Figure 3 illustrates. File record 0 contains attribute information for the MFT itself, and record 1 references a partial MFT backup that can be used to reconstruct the first 16 file records if the original copy becomes damaged. The log file records information that allows an

NTFS volume to be restored to a functioning state if a power failure or other error interrupts the file system at a critical moment. The volume information file contains information such as the volume name, and the attribute definition table defines the various attributes that the file system supports.

Other metadata files contain additional information critical to file system operation. The root directory holds information about the volume's root directory. The allocation bitmap maintains a record of the disk's allocation state, with each cluster on the disk represented by one bit in the bitmap. The boot file contains the Windows NT bootstrap loader; it also contains the physical address on the disk of the MFT. (At startup, NTFS consults the boot file to find the MFT. The boot file itself is easily located, because it is stored at the same address on every NTFS volume.) Finally, the bad cluster file contains a map of the volume's bad clusters so that NTFS can tell which parts of the disk not to use.

The implications of this file system architecture may not be obvious, but they are far-reaching. NTFS corrects the deficiencies found in the VFAT file system and then some. The number of files and subdirectories in the root directory, for example, is limited only by available disk space, because the root directory is stored in the same manner as subdirectories. Run addresses are encoded in 64-bit values, so the cluster size can be set independently of volume size. Volume sizes can be adjusted after the fact, because file-tracking structures are stored in file form rather than hard-coded on the disk. In other words, NTFS volumes can be repartitioned without erasing everything and starting over. (NTFS can even create a volume by combining leftover free space on several hard disks.) And the fact that the MFT is just another file means critical file system information can be stored anywhere on the disk. VFAT, by contrast, requires that system data be located in specific areas of the disk. If bad sectors develop in those areas, the entire volume might become unusable.

Another area in which NTFS improves upon the VFAT file system is file lookup time. File records for NTFS directories contain sorted lists of the files in those directories, so filenames are automatically

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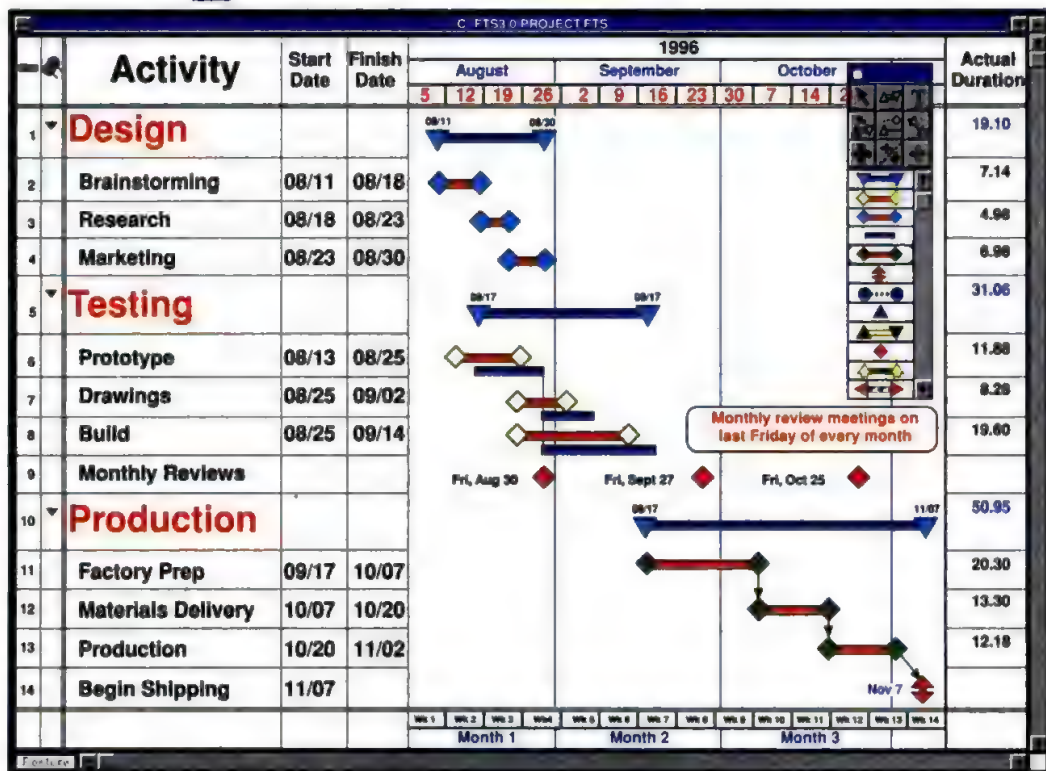
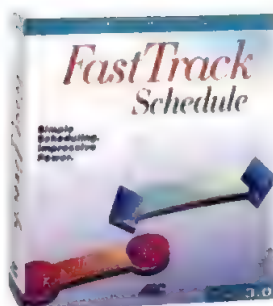
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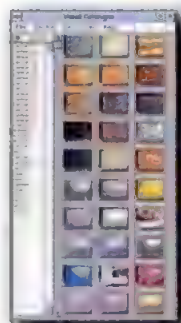
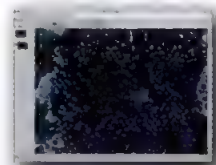
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alphabetized. For large directories, NTFS indexes the filenames using a b+ tree data structure, which dramatically reduces the time required to locate a particular file in a directory. A b+ tree data structure is a type of balanced binary tree that organizes information in such a way that locating a particular object among 1,000 objects of its kind requires, on average, less than 10 accesses. The same search operation performed on 1,000 sequentially organized objects, like filenames in a VFAT directory, requires an average of 500 accesses. If you double the number of items in a VFAT directory, then finding a particular item takes twice as many accesses. If you double the number of items in an NTFS directory, only one more access is required. As a result, NTFS handily outperforms VFAT in file lookups, and the more files in a directory, the more NTFS shines.

NTFS also takes steps VFAT doesn't to ensure volume and file integrity. For starters, it uses a transaction-based processing model that logs every file system operation performed on a disk. If NTFS starts up and finds that a transaction

wasn't completed (perhaps because of an untimely power outage), it "rolls back" the portion of the transaction that was completed and thus restores the on-disk file system structures to a consistent state. This virtually eliminates problems such as lost allocation units and cross-linked files that are common on FAT volumes. When NTFS encounters an unreadable sector, it automatically flags the cluster containing the sector in the bad cluster map and, if possible, recovers the data and transfers it to a fresh location on the disk. If data integrity is of the utmost importance, NTFS allows data to be stored redundantly on separate hard disks. Properly configured, NTFS can overcome even such catastrophic occurrences as hard disk failures and drive controller malfunctions.

The bottom line is that NTFS is both safer and faster than VFAT, and it is far more flexible. If you'd like to learn more, pick up a copy of Helen Custer's *Inside the Windows NT File System* (1994, Microsoft Press). This 91-page book offers a thorough overview of NTFS and some revealing historical insights into its design.

NTFS LITE? What Windows 95 really needs is an "NTFS Lite"—NTFS minus the high-end features that most users wouldn't care about anyway. Users could choose between VFAT and NTFS Lite based on their individual file system requirements.

The good news is that Windows 95 will support NTFS, "NTFS Lite," HPFS, or any other file system if someone would only write the drivers. VFAT is implemented as a file system driver (FSD) that runs underneath Windows 95's Installable File System (IFS) Manager in ring 0 of the 386 protection model. Windows 95's Compact Disc File System (CDFS), which replaces MSCDEX as the system's primary interface to CD-ROM drives, works the same way. Adding a new file system to Windows 95 is as simple as plugging in a new FSD. The catch is that someone must write the FSD, and writing an NTFS driver is not easy.

Microsoft apparently has no plans (at least for now) to write an NTFS driver for Windows 95. Third-party software developers take note: There's an opportunity waiting out there for someone with the technical know-how to pull it off. □

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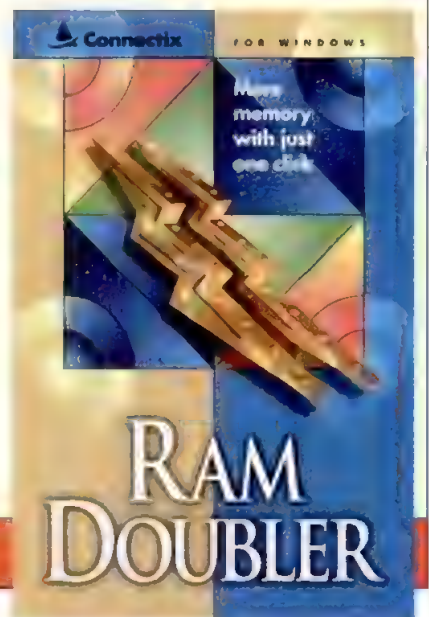
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Corporate Developer

BY BARRY SIMON

Designing with Style: The Win 95 User Interface

Windows owes its popularity less to a pretty face than to its common user interface. Initially that meant little more than a File Menu with Open and Save on it, but as the industry evolved, the common elements of the interface have become increasingly important. Maintaining a common interface eliminates the learning curve when changing applications, and this should be foremost in your thoughts as you plan to move your apps to Windows 95.

Using common interface elements, such as the Common Dialogs that shipped with Windows 3.1, has additional advantages. First, it allows transparent upgrading of components. Any Windows 3.1 application that uses the Common Dialogs, when run under Windows 95, has an open dialog with something of the Windows 95 look and feel. This is apparent in Figures 1, 2, and 3. Second, third parties can expand system components and thus all applications that use them. The Norton Desktop's FileAssist, which added a recently used list and other enhancements to the common file dialogs, is a good example.

Many large commercial developers have tried to distinguish their products by incorporating their own interfaces—even Microsoft's WinWord uses dialogs that look like the common dialogs for Open and Save but that are, in fact, custom code. Such companies are unfortunately putting market differentiation ahead of user benefit. As a corporate developer, you owe it to your users to include as fa-

miliar an interface as possible.

What determines the design conventions you should use? Under Windows 3.1, it was a book in the SDK called *The Windows Interface: An Application Design Guide*—a volume that was too often ignored by developers. For Windows 95, this document has been updated and has grown by almost 50 percent. In the beta it is called *User Interface Design Guide*, although informally Microsoft often refers to it simply as the *Style Guide*, and the name may change before its official release.

During the beta phase, the *Style Guide* is available on the SDK CD in the form of nearly 30MB of WinWord 6.0 files locat-

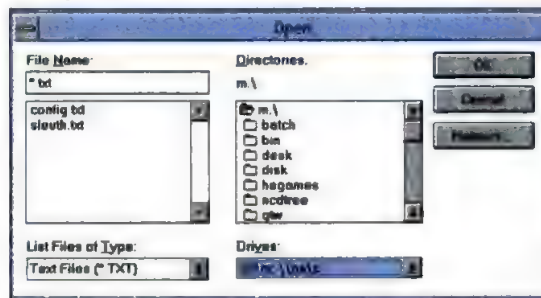


Figure 1: This is the familiar Windows 3.1 common dialog for open file as it appears in the Windows 3.1 Notepad. (The \\ in the Drives window indicates that drive C: is mapped to the M: drive.)

ed in the \SDK\UISTYLE subdirectory. It is also available on the Level 2 MSDN CDs. If you don't have Word 6.0, Windows 95 includes a program called WordPad that will read the files. The 300-page *Style Guide* should be a bible during your design phase, so print it out or move the files to your hard disk for easy access.

The Windows 95 *Style Guide* is a rather different document from its Windows 3.1 predecessor. The old version dealt mainly with nuts and bolts: what key combination to use in multiple-choice drop-down list boxes, for example. The new guide is sprinkled with general design advice such as "Provide feedback that is appropriate to the task." The Windows 3.1 guide had a brief four-page design overview; the new guide has not only ten pages at the start, but also a 25-page chapter on Visual Design.

Although slavish adherence to the *Style Guide* is not called for, many of the new User Interface elements in Windows 95—including button bars, tabbed dialogs, and tool tips—evolved from experiments in Win 3.x applications that the marketplace embraced. What is important is that you understand what the guidelines call for so that you violate them only with good reason.

This article, the first of two parts, gives an overview of some of the main aspects of the Windows 95 style recommendations. In the second part, I'll focus on some parts of the UI in detail and discuss such supplemental issues as the Setup guidelines.

DOCUCENTRIC, OBJECT-ORIENTED Microsoft has been predicting that we are heading toward an environment in which the document is king and objects are the central metaphor. With Windows 95, this new world has arrived. The cynic might say that Hewlett-Packard's New Wave has finally taken over the desktop.

This changed world view, which is pushed throughout the *Style Guide*, has profound implications for UI implementation and application structure. It even affects such mundane issues as the display of file extensions. In a word, file extensions are out. If applications are no longer the central player, so the reasoning goes, then extensions shouldn't

be thrust into the user's consciousness.

The suppression of extensions in filenames fits with the shift to long filenames. If you have a file named "mbday95.doc," the ".doc" is clearly an important reminder of what the file is. If the file is called "Birthday letter to Mom, March, 1995," a ".doc" extension is no longer nec-

essary and can even be confusing.

The *Style Guide* recommendation is that the file extensions should be dropped when a filename is displayed in the title bar of your application. A second recommendation is that you place the document name before the application name in the title bar. Thus, for example, if you open AUTOEXEC.BAT in WordPad, the title bar will read "Autoexec - WordPad."

This placement not only is docucentric, but is important for the display of the minimized application in the taskbar. This Windows 95 feature, shown in Figure 4, normally sits at the bottom of your screen and displays the title-bar information for all running applications. But if you have a good many applications open, the full name is truncated. As one wag put it, "Open several copies of Notepad and it says 'Not Not Not' at the bottom of your screen," as you can see in Figure 5. Especially if multiple instances of your application can be open, it is important to place the filename first to avoid confusion in the task bar. The docucentric view also implies that OLE support is likely to be a significant feature in any application that you write.

The second half of the docucentric/object world view is also important. *Object* is not used here in the sense employed in object-oriented programming languages; it refers simply to the encapsulation of data with methods to manipulate that data. OOP languages are one way to write programs with this kind of object, but the non-OOP Visual Basic is also a good vehicle.

In the old spreadsheet metaphor, one picked an operation and then the range on which it operated. From the point of view of objects, it's natural to choose the

object first and then the method that will act on it. While it's a good idea to provide multiple ways for the user to interact with data, as users get used to the object metaphor it becomes especially important

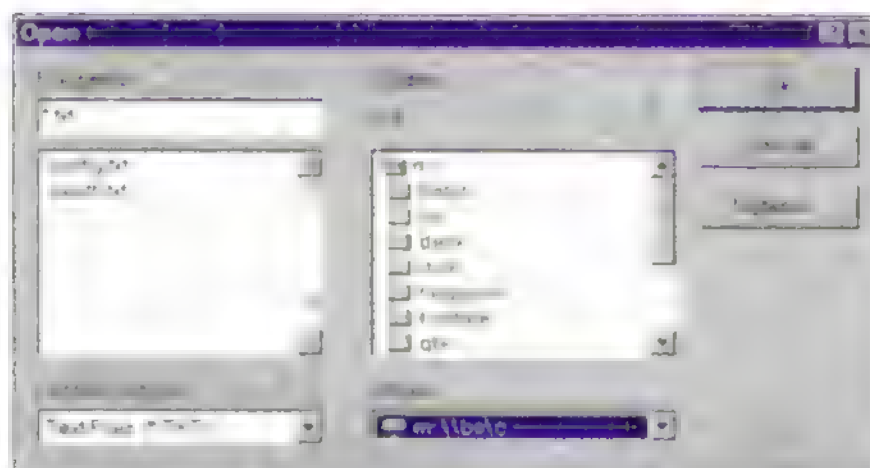


Figure 2: Here is the changed appearance of the open dialog for Windows 3.1 applications run under Windows 95, again seen in the Windows 3.1 Notepad.

to provide modes in which the object is selected before the action is picked.

CHANGES IN FAMILIAR FACES A number of aspects of the Windows environment have changed in a way that will affect how you design your applications: Icons have changed, double-clicking is frowned upon, and you are encouraged to

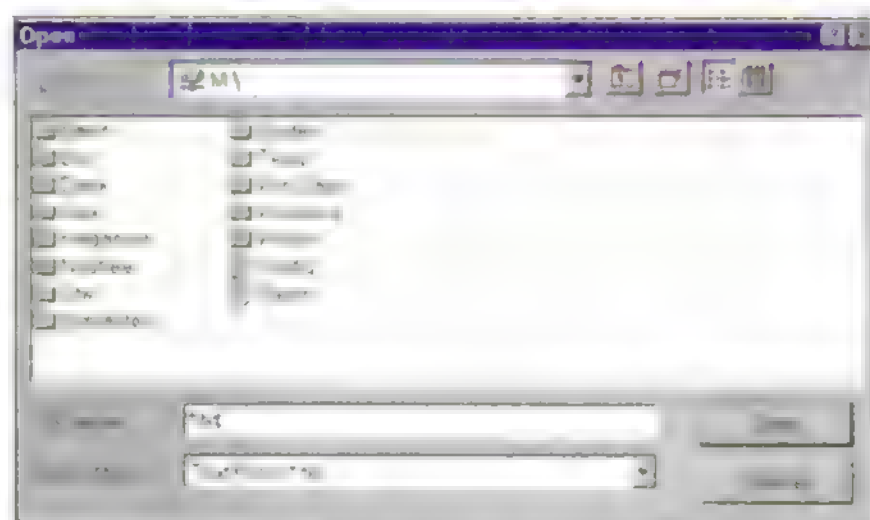


Figure 3: This is the open dialog used by applications written for Windows 95, shown in Windows 95 Notepad.

consider alternatives to MDI! Briefly, applications are encouraged to make certain that the icon resources they register in the registration database contain icons in three formats: 16-by-16 and 32-by-32 with 16 colors and—a format brand-new to Windows 95—48-by-48 with 256 colors.

Microsoft's testing showed that one of the biggest problems users encountered with Windows 3.x was getting the hang of double-clicking. I have a close friend who is double-click challenged, and I can assure you the problem can afflict even experienced users. For this reason, Microsoft now recommends that you avoid making a double click the sole or even the main method of accessing a feature.

The flip side of double-clicking being out is that the right button is in. Windows 3.1 didn't use the right mouse button at all. In Windows 95, it seems that the right button is king. Of course, many users are familiar with the use of the right mouse button to bring up a local menu, but Windows 95 has a new use for this button that will be particularly attractive to experienced users: right-mouse drag-and-drop. Basically, if you right-drag-and-drop when you reach the target and drop the object, a menu pops up giving you a choice of actions. One item in the menu is boldfaced; it indicates the default action taken if a left drag-and-drop is done. The *Style Guide* calls right drag-and-drop "non-default drag-and-drop."

As an example, consider what happens with Explorer, the new Windows 95 File Manager. If you right-drag-and-drop a program file from an Explorer window to the desktop, the default is to create a shortcut to the file on the desktop (see Figure 6). But you can also choose to copy or to move the file there. (The desktop is actually the directory \windows\desktop, and the shortcut option creates a link file; Copy and Move literally copies the .EXE file to the desktop directory and deletes the original.)

In your application, right-drag-and-drop menus might enter in two places. If the application is an OLE drag-and-drop target, be sure to support right pop-up menus. An OLE object right-dragged to your application could offer a variety of ways to accomplish the embedding, for

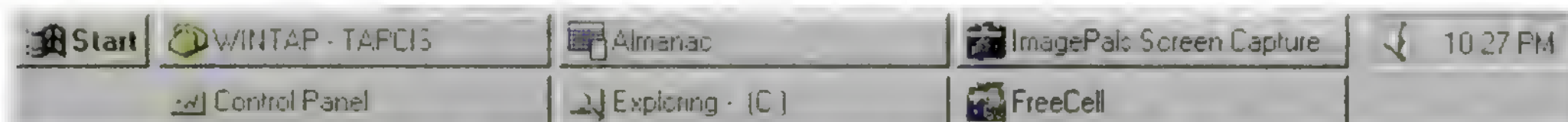


Figure 4: Here is the Windows 95 taskbar, shown running six applications at 1,024-by-768 resolution.

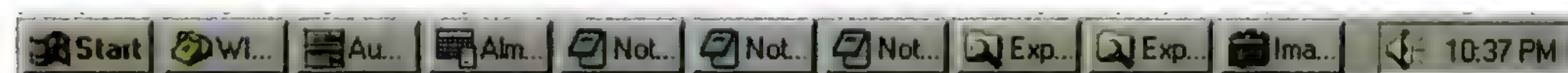


Figure 5: The three Notepad tasks shown here display why it is a good idea to place the document name before the application name in your title bar.

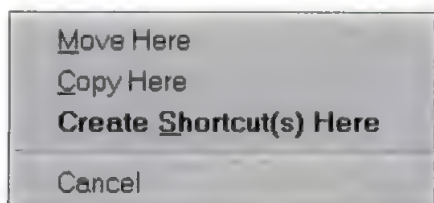


Figure 6: This is the menu that pops up when you right-drag-and-drop an .EXE file from the Explorer to the desktop.

example. If you support drag-and-drop operations internal to your application, remember to support the non-default menus where appropriate.

WINDOW MANAGEMENT Microsoft's usability studies also turned up problems with the Multiple Document Interface (MDI). Less experienced users get confused by the fact that MDI windows behave differently from other windows on-screen. When minimized, they disappear to someplace other than the bottom of the screen. Particularly puzzling is that some windows that seem to be inside other windows can be dragged outside, while others cannot.

Another reason you may want to use MDI only after careful consideration is that it focuses on the application rather than on documents. If you are porting an MDI application to Windows 95, you need to be aware that the interface is changed in a way likely to make it less attractive. The original idea behind MDI was to put the desktop in microcosm inside your application. If minimized applications on the desktop are no longer icons but mere blobs in a taskbar, then MDI should do the same—minimized documents no longer are icons, but are simply blobs.

As a method for keeping running applications straight, the taskbar is effective, at least if your screen resolution is high enough to fit enough tasks on the bar. To me, it is a lot less effective as a metaphor for minimized MDI children—so much so that you may want to abandon MDI in favor of an alternative approach.

The *Style Guide* devotes an entire chapter to Window Management, including several alternatives to MDI. I think it fair to say that, for now, handling multiple windows is a problem without an ideal resolution. One solution is to let it all hang out: Have each subwindow of your application be a principal one. This is exactly what the Microsoft Network application

does; the biggest problem with this is that the taskbar can fill up awfully quickly.

An alternative solution is the "Workspace" approach proposed by the *Style Guide*. This is an extension of MDI that pushes the metaphor of your application as a microcosm of the desktop even further, incorporating other elements of the Windows 95 desktop, including icons for unopened documents.

Perhaps the only conclusion to draw about window management is that one size does not fit all; you will have to tailor the approach you use.

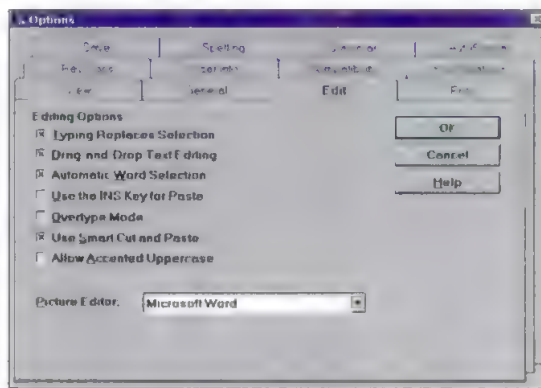


Figure 7: A multirow tabbed dialog like this one from Word can be confusing when you click on a rear-row tab.

THE QUICK ONCE-OVER There are a number of items to keep in mind that I'll only be able to touch on briefly here.

You should make use of the new UI elements, many of which come with custom controls callable from the API. Among them are tabbed dialogs, property sheets, tree control, and column header control.

New too is the notification area in the taskbar, which by default contains the speaker icon (assuming you have a sound card) and a time listing (as shown in Figures 4 and 5). Several "new" controls, already in common use but now provided by the system, include spin buttons, sliders, and progress indicators (gas gauges). And don't forget the Help Engine, which I discussed in our issue of February 21, 1995.

Remember also to use tooltips, which pop up to provide textual descriptions of a button or other graphical element on which the mouse cursor stops. (For more information, see this issue's Power Programming col-

umn.) And Status Bar help messages for your button bars will make the icons a little less inscrutable.

Take one tip from Simon's style guide rather than Microsoft's. If at all possible, avoid the multirow tabbed dialogs like the one taken from WinWord 6.0 shown in Figure 7. Single-row tabbed dialogs are a wonderful way of taming complex dialogs, but the seemingly random shuffling of tabs as you shift a back row forward in multirow tabbed dialogs is confusion incarnate.

If your application supports filename drag-and-drop—to open additional documents, for example—remember to support *shortcuts*; that is, files with the extension .LNK. You want to be sure to open the file the shortcut is pointing toward rather than the shortcut itself. The IShellLink API function is for creating, modifying, and following shortcuts.

Examine the somewhat softer look of the Windows 95 dialogs and icons when designing your own. Figure 8 shows samples from the *Style Guide*: the Win 3.1 Notepad icon on the right and, on the left, its recommended softer version (which won't necessarily be precisely what is used in the shipping Windows 95 Notepad). Observe that the thin black outlines surrounding the Notepad icon in Windows 3.x have become gray in some places. Moreover, the new dialogs have 3-D effects and don't use bold fonts.

The new User Interface of the Windows 95 desktop is a complete makeover of what is offered in Windows 3.x. Can you afford to do less? □



Figure 8: A tale of two icons: On the right is the Windows 3.1 Notepad icon. On the left is a bitmap taken from the *Style Guide*, which may not be the actual icon used in Windows 95. It does illustrate that the new guidelines use a softer look; note the use of less black and more gray and white.

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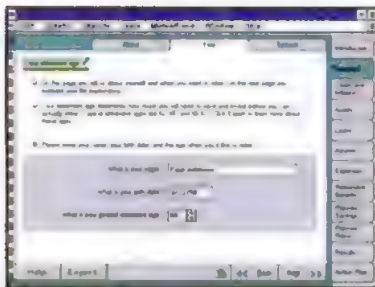
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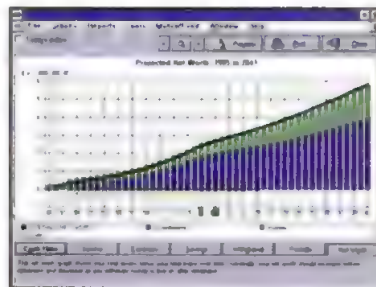
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Toolkits

BY JONATHAN WALDMAN

Create One-File Windows Programs

Tired of having to ship a lot of separate files with your application? Versatile Control Systems' VEXE, Version 1.0 (\$99), lets you wrap any Microsoft Windows 3.1-compatible executable, along with its supporting .VBX (custom control), .DLL (dynamic link library), and .HLP (Windows Help) files, into a single executable. This makes programs easier to install and uninstall—handy for quick demos at client sites—and helps in VBX version control.

With VEXE, embedded VBXs won't be overwritten by incompatible versions during another program's installation routine. But if a particular VBX is already loaded in memory because another program is using it, your program will use that VBX rather than loading its embedded VBX, and the in-memory VBX may be incompatible. Version 1.1, not yet available at the time of this review, will let you force Windows to use the embedded files.

EASY TO USE VEXE's "virtual executables" fool Windows into thinking the embedded files are simply in the application's home directory. When you load the program, a stub executable launches the embedded EXE, which in turn summons the other embedded files as needed. You tell VEXE which files to embed, and the program does the rest.

VEXE's drag-and-drop interface contains a file browse window on the left and a box just below it with details about the currently selected file such as the date/time stamp and size. You select files by dragging them to the Embedded File list box on the right.

When you select a .DLL, .EXE, or .VBX file, VEXE displays other files ref-

erenced by it and the count and names of the functions it imports and exports. If it can, VEXE also reveals the names of the files where the functions are stored. You can add these files to the Embedded Files list manually or ask VEXE to search for them. Advanced users can also use VEXE's hex and ASCII file viewer to visually identify the referenced files or functions that VEXE may have missed. When the Embedded Files list is complete, you launch the build process by clicking Go.

Since it takes time to build the Embedded Files list, VEXE lets you save your configuration for use after bug fixes or other program changes. You can load the configuration file during future VEXE sessions or use it in VEXE's command line mode to build the executable.

Correct use of VEXE requires an understanding of how programs interact with Windows. Because VEXE does not distinguish between Windows- and application-specific files, it is possible, but

wrong, to embed Windows system files such as USER.EXE and KERNEL.EXE.

Also, except when creating demos that you can quickly install and uninstall, you may not want to embed every file your application uses. Widely accessed files such as CMDIALOG.VBX are better installed in the Windows SYSTEM directory, where other programs can update and share them. VEXE forbids you to embed files that are written to, such as database or .INI files. Lastly, VEXE-generated executables that include all program files may be too large to fit on a single disk. VEXE does not preclude the need for a setup program, but it simplifies the tasks the setup program will need to perform.

VEXE has some limitations. You can embed no more than 40 files. Also, VEXE can be run only under Windows 3.1, Windows for Workgroups 3.11, or OS/2 2.1 for Windows (which uses the existing Windows 3.1x system). For other host systems, you can use the /VEXPLODE switch to extract embedded files for manual copying to the appropriate directories.

You may need VEXE only occasionally, but when you do, you'll find that its excellent documentation and smart design make it a pleasure to use. □

VEXE, Version 1.0. List price: \$99. Requires: 386-based PC or better, 1MB hard disk space, DOS 3.1 or later, Microsoft Windows 3.1 or compatible. Versatile Control Systems, 2655 N. Ocean Dr., Singer Island, FL 33404; 407-881-9050; fax, 407-881-7345.

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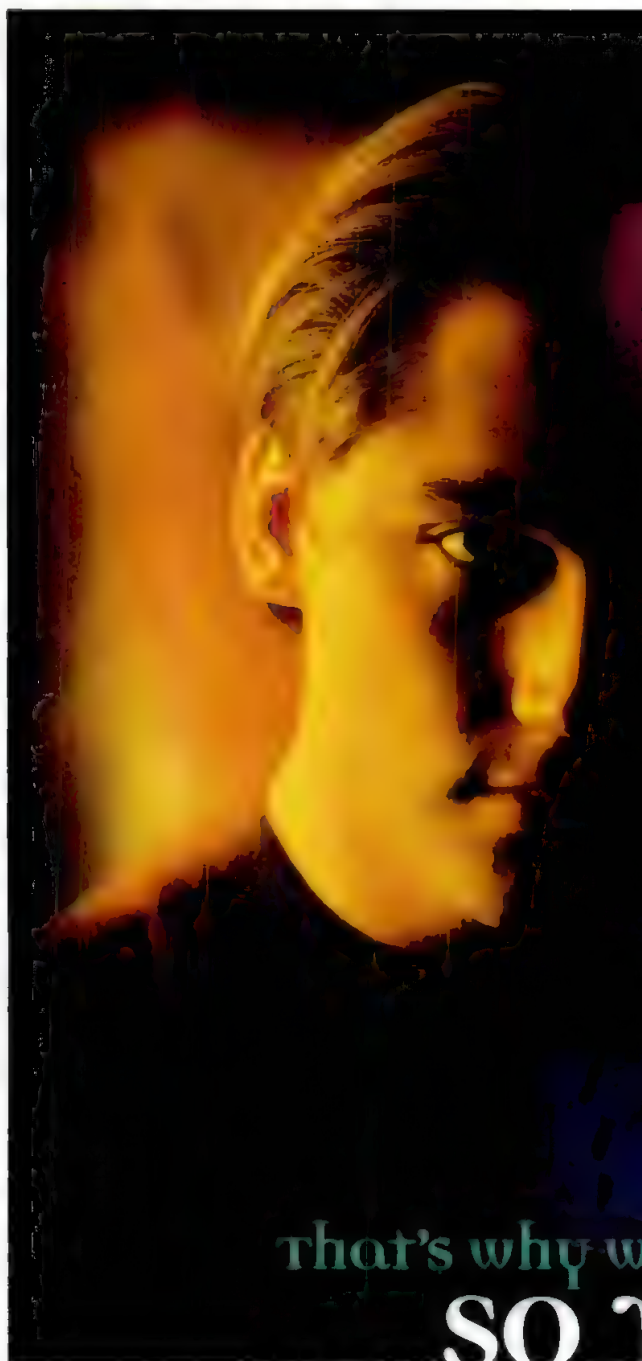
OFF THE STACK

● **Visual QuickBASIC, Professional Edition** (\$495), from Basmark Corp., offers the usability of a visual environment with the speed and power of a true 32-bit compiler. As a Win32s application, it runs natively on Windows 3.1 or Windows NT. It creates true EXEs and DLLs—no pseudo-code—and adds features such as pass by value/reference, redimensional arrays, and direct memory access. Extensive math libraries are available for scientific applications. *Basmark Corp.*; 216-871-8855; fax, 216-871-9011.

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● **PowerBASIC Developer Kit for Windows (PBDK)**, from PowerBASIC, lets PowerBASIC developers move DOS programs to Windows without rearchitecting them. The package (\$299) offers both procedural and event-driven programming options. Programmers can link with .OBJ files as well as DLLs. Over 350 predefined functions give access to Windows resources such as menus, dialog boxes, and DDE channels. PowerBASIC produces true executables, not pseudo-code. *PowerBASIC Inc.*; 800-780-7707; 408-659-8000; fax, 408-659-8008.

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Power Programming

BY RAY DUNCAN

An HTML Primer

Hypertext markup language (HTML) spits in the very face of the last decade's trend toward graphically based WYSIWYG word processing. For people who started using personal computers after the advent of applications such as Microsoft Word for Windows, creating World-Wide Web documents in HTML may initially seem about as intuitive as writing a device driver in pig Latin. The situation is exacerbated by the amazing absence of high-quality HTML-aware document-preparation tools; even the best HTML editors are pitifully primitive compared with any mass-market word processor, let alone with an industrial-strength source-code editor such as CodeWright or the late, lamented Brief.

On the other hand, for those of us who vividly remember the era of WordStar on CP/M computers with 8-inch floppy disks, or who have had unpleasant encounters of the third kind with Unix-based text formatters such as nroff or TeX, the task of preparing documents in HTML feels all too familiar. Like those other relics of the computer dark ages, HTML is command-driven and state-sensitive.

An HTML document is an ordinary text file, and the document's ultimate appearance is controlled by magical sequences of characters scattered about the text that is the document's real "message." Preparing a document in HTML is more like application development than desktop publishing, because it involves an endless cycle of modifying the HTML source in a text editor, loading the file into a Web browser to see how it looks and prints, figuring out what the problems are, and going back to the text editor to make further changes.

Sounds severely retro, eh? Those nerds who dreamed up the World-Wide Web, they are so clueless! But wait . . .

perhaps we are judging HTML by the wrong set of standards; maybe the goals of HTML are not the same as the goals of a personal computer word processor. Suppose you were one of the gnomes of Zurich (or was it CERN?) and you wanted to devise a method of encoding complex hypermedia documents that was focused on document structure rather than physical appearance. Imagine you wanted these documents to be portable across every imaginable CPU architecture, operating system, network transport, and method of mass storage. Pretend you had no way to predict the capabilities of the system on which the document would be viewed or printed, even to the level of a minimum screen resolution, number of colors, or repertoire of fonts. Given these constraints, you might come up with something very much like HTML after all.

THE HTML LANDSCAPE HTML formatting commands, known as *tags*, are merely reserved sequences of characters that start with < (the mathematician's "less than" symbol) and end with > (the "greater than" symbol). HTML tags are not case-sensitive, in contrast to HTML special-character escape sequences (which we will return to later). In most cases, the tags are used in symmetric pairs, with the final tag indicated by the inclusion of a / (slash) character. For example, if we have a hypothetical text-formatting attribute controlled by the tag <X>, and we want to apply this attribute to the words "This is my text," then the HTML sequence of tags and text is as follows:

```
<X>This is my text</X>
```

This scheme of symmetric tags looks a lot like the tags used in the industry-standard SGML (Standard Generalized Markup Language), and indeed the originators of HTML must have been strongly influenced by their knowledge of SGML. But HTML is not a little brother of SGML; it's more of a Forrest Gump-like cousin. HTML can be wedged into the framework provided by an SGML document type definition (DTD), but it doesn't begin to exploit the full capabilities provided by SGML. This is fortunate in a way, because SGML editing tools are still found mainly on high-end workstations and have price tags that would make any personal computer network manager turn pale with fear.

At any rate, three different versions or levels of HTML are currently coexisting on the World-Wide Web. HTML, Version 0.9 or 1.0 (which is the version supported by the groundbreaking browser found in Mosaic, Version 1.0.3) concerns itself mainly with control of headings,

For people who started using PCs after the advent of GUI word processing, creating World-Wide Web documents in HTML seems like writing a device driver in pig Latin.

lists, and character formatting. The HTML commands that this column will discuss are almost all found in HTML, Version 1.0; they are easy to learn and use, and will probably suffice for the first several months of your Web publishing efforts. For the purposes of this discussion, I am going to group the HTML 0.9/1.0 commands into eight categories:

- **structural commands** identify a valid HTML document and indicate the beginning and end of logical sections within the document;
- **text-flow commands** indicate the ends of paragraphs, forced line breaks, headings, indented or preformatted text, and so on;
- **heading commands** provide for the formatting of six different levels of headings and subheadings;
- **character-formatting commands** apply a "physical" or "logical" style to a stream of characters;

- **list commands** are used to format several different kinds of lists;
- **special-character escape sequences** are used to display glyphs that are not in the ASCII character set, characters that can't be entered with the author's keyboard, or characters that would otherwise be interpreted as HTML commands;
- **in-line graphic commands** identify an external file as a graphic resource to be retrieved and displayed within the document's text by the Web browser;
- **anchor commands** create a *hyperlink* or serve as the target of a hyperlink.

HTML, Version 2.0, supported by second-generation Web browsers such as Netscape Navigator 1.0 or ElNet Galaxy's MacWeb, adds commands for menus and interactive forms. The Windows and Macintosh versions of Mosaic, Version 2.0, which would be the first version to support forms, have been in beta testing since forever, but Mosaic has been so extensively displaced by Netscape that the laggardness of the Mosaic development team has essentially become irrelevant. The prevalence of Netscape Navigator 1.0 means that it is safe to take the user's access to forms capabilities for granted, and you can use form commands freely in

features of the proposed HTML 3.0 specification. We'll talk more about HTML 2.0 and 3.0 commands in future installments.

STRUCTURAL TAGS The three most important HTML tags in the structural group are `<HTML>`, `<HEAD>`, and `<BODY>`. These provide fundamental identification and document-organization information for the Web browser that retrieves the document.

The tags `<HTML>` and `</HTML>` are placed at the beginning and end of the entire document, respectively, and identify the document as a valid document encoded in hypertext markup language. More precisely, these tags bound the portion of the document that the Web browser is expected to understand and render on the screen for the user. Practically speaking, none of the browsers in use today either require the `<HTML>` tags or do anything with them. But make it a habit to use them anyway; this will probably head off some future problems as browsers and HTML editors become more sophisticated and complex.



The heading section of the document is framed by `<HEAD>` and `</HEAD>` tags. The use of the `<HEAD>` section often confuses newcomers to HTML. It's important to note that nothing in the `<HEAD>` section appears in the scrollable or *client* section of the Web browser's window. Only a few tags are allowed to appear between the `<HEAD>` and `</HEAD>` tags, and of these few, the only ones that will be of any interest to you at present are the `<TITLE>` and `</TITLE>` tags.

When text is marked off by the `<TITLE>` tags, the Web browser displays it in the title bar of its window. More important, when the user really likes one of your on-line documents and wants to add it to a "hotlist" (in Mosaic) or "bookmarks" (in Netscape) in order to return to it quickly, the `<TITLE>` tags supply the text that is added to the

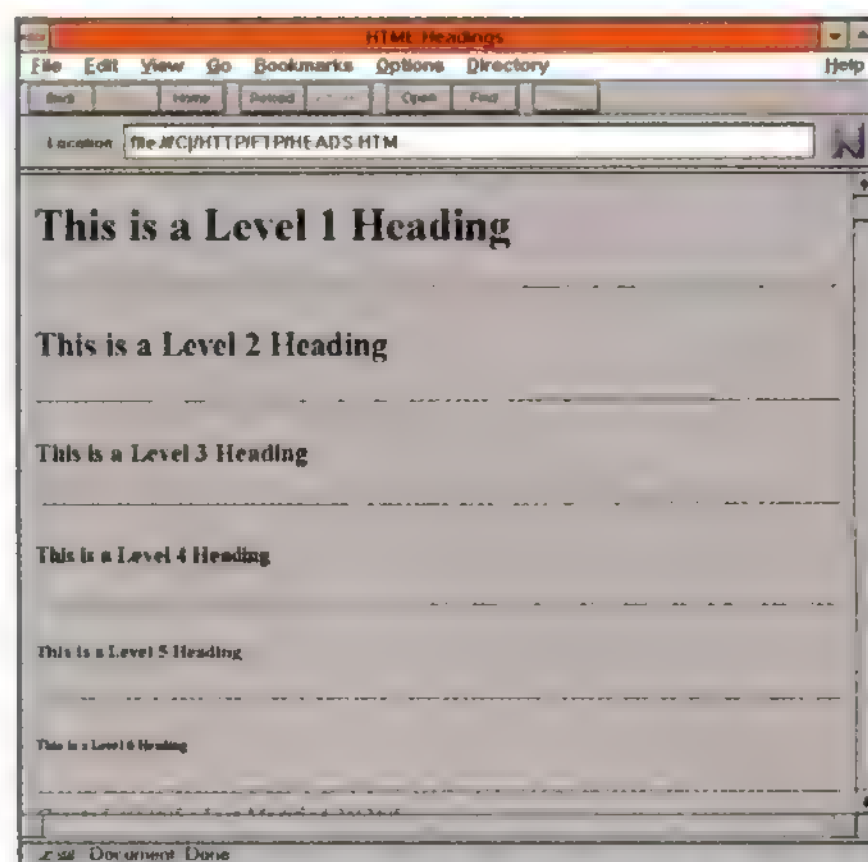


Figure 2: These heading types were produced on a Web browser by the HTML code in Figure 1.

hotlist or bookmark list. So make your document's `<TITLE>` text specific and descriptive rather than vague and generic. For example, don't write

```
<TITLE>Table of Contents</TITLE>
```

but instead write something like

```
<TITLE>PC Magazine HTML Crash Course  
- Contents</TITLE>
```

The `<BODY>` and `</BODY>` tags define the portion of the HTML document that will be displayed to the user within the client area of the Web browser's window. The body consists of an arbitrary mixture of text paragraphs, horizontal rules, headings, and lists, with embedded tags for character formatting, hyperlinks, and in-line graphics. The rest of the tags we are going to discuss in this installment are all used within the `<BODY>` section.

In summary, the overall structure of a typical HTML document is

```
<HTML>  
<HEAD>  
<TITLE>  
Window Title Text  
</TITLE>  
</HEAD>  
<BODY>  
Document Content Text  
</BODY>  
</HTML>
```

```
<HTML>  
<HEAD>  
<TITLE>HTML Headings</TITLE>  
</HEAD>  
<BODY>  
<H1>This is a Level 1 Heading</H1>  
<HR>  
<H2>This is a Level 2 Heading</H2>  
<HR>  
<H3>This is a Level 3 Heading</H3>  
<HR>  
<H4>This is a Level 4 Heading</H4>  
<HR>  
<H5>This is a Level 5 Heading</H5>  
<HR>  
<H6>This is a Level 6 Heading</H6>  
<HR>  
<ADDRESS>  
Created 3/13/95 / Last Modified 3/13/95<BR>  
Cedars-Sinai Medical Center / duncan@csmc.edu  
</ADDRESS>  
</BODY>  
</HTML>
```

Figure 1: This HTML source code demonstrates various HTML heading types.

your HTML documents.

HTML, Version 3.0, which is not yet finalized, supports (among other things) background bitmaps and a rich set of commands for formatting tables. Netscape Navigator 1.1, in beta testing as this is being written, implements many of the

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TEXT-FLOW TAGS The three most commonly used tags in the text-flow group are <P>,
, and <HR>. These are singleton tags rather than paired tags; in other words, browsers do not require (or take any action on) </P>, </BR>, or </HR> tags.

```
<HTML>
<HEAD>
<TITLE>HTML Character Formatting</TITLE>
</HEAD>
<BODY>
<H1>Examples of HTML Character Formatting</H1>
<HR>
<B>This is "bold" text.</B> <BR>
<I>This is "italic" text.</I> <BR>
<TT>This is "typewriter" text.</TT> <BR>
<EM>This is "emphasized" text.</EM> <BR>
<STRONG>This is "strong" text.</STRONG> <BR>
<CITE>This is "citation" text.</CITE> <BR>
<CODE>This is "code" text.</CODE> <BR>
<SAMP>This is "sample" text.</SAMP> <BR>
<KBD>This is "keyboard" text.</KBD> <BR>
<VAR>This is "variable" text.</VAR> <BR>
<DFN>This is "definition" text.</DFN> <BR>
<HR>
<ADDRESS>
Created 3/13/95 / Last Modified 3/13/95<BR>
Cedars-Sinai Medical Center / duncan@csmc.edu
</ADDRESS>
</BODY>
</HTML>
```



Figure 3: This HTML source code demonstrates various HTML character-formatting tags.

The <P> tag indicates the end of a paragraph and is comparable to the ¶ tag in Rich Text Format (RTF) or the ¶ paragraph mark you see on-screen in a WinWord document in place of the Enter key (assuming you have turned on the display of nonprinting characters in the WinWord Tools Options View dialog box). Other tags permitting, all the text between <P> tags can be reflowed by the Web browser according to the window size, the metrics of the display fonts, and so on. By convention, Web browsers use one line height's worth of white space to set each paragraph apart from the next.

The
 tag forces a line break, or a hard return, and is comparable to the use of Shift-Enter in WinWord. The
 tag does not imply the end of a logical paragraph, and a line terminated with
 is not followed by any extra white space. A typical use of
 tags would be to ensure that the elements of a name and address are displayed on separate lines rather than reflowed and run together by the browser.

The <HR> tag tells the browser to draw a horizontal rule across the client

area of its window. It has the secondary effect of acting like a
 tag; the flow of the paragraph is interrupted at the point of the <HR> tag, the horizontal rule is drawn with a "reasonable" amount of white space above and below, and then text display resumes at the left margin below the rule. If you want additional white space between the text and the horizontal rule, you can insert a <P> tag before and after the <HR> tag. The handling of the <HR> tag by the existing Web browsers is quite variable. Some just draw a simple black 1-pixel-wide line across the client area. Others, such as Netscape Navigator, render the <HR> tag as an elaborate three-dimensional shaded graphic.

For several reasons, using the <HR> tag is far preferable to hard-coding visual separators into the HTML document as text underscores or "in-lining" a separate graphic object. The browser knows the window's width and the system's capabilities, and it can render the horizontal rule efficiently and appropriately. Use of the <HR> tag also gives documents a more consistent look for the end user. Finally, the <HR> tag is compact and can be transferred over the network much more quickly than a series of underscore characters or a bitmapped graphic.

There are three more text-flow tags you will want to keep in the back of your mind for specialized situations, although you will not need them very often. The <PRE> and </PRE> tags delimit text that is preformatted. Unlike ordinary text in an HTML document, which is displayed in an attractive proportional font and reflowed at the browser program's discretion, the text marked off by <PRE> is displayed in a nonproportional font, and the arrangement of white space (tabs, carriage returns, and strings of ASCII spaces) is respected. In HTML 1.0 and 2.0, the <PRE> tags are essentially the only way to pre-

sent tabular information, although the result is not very attractive.

The <LISTING> and <BLOCKQUOTE> tags are conceptually similar to the <PRE> tags. Text between <LISTING> and </LISTING> tags is considered to be program source code or a listing generated by a programming language translator. Current browsers treat <LISTING> text about the same as <PRE> text; the distinction may become more useful in the future, as browsers are increasingly used as front ends to various databases, including source code and documentation repositories. The <BLOCKQUOTE> and </BLOCKQUOTE> tags frame a quotation or an extract from another source. The quoted text is indented from both margins, preceded and followed by a browser-dependent amount of extra white space, and may be displayed in a different font.

HEADING TAGS HTML provides six levels of heading tags, which you can use to format headings and subheadings within your document: <H1>, <H2>, <H3>, <H4>, <H5>, and <H6>. These tags must be used in pairs; for example, the HTML sequence

```
<H1>My Heading</H1>
```

would display the text "My Heading" as a level-one heading. Although the actual typeface and type size that are used to display each level of heading are browser-dependent (and may even be user-config-

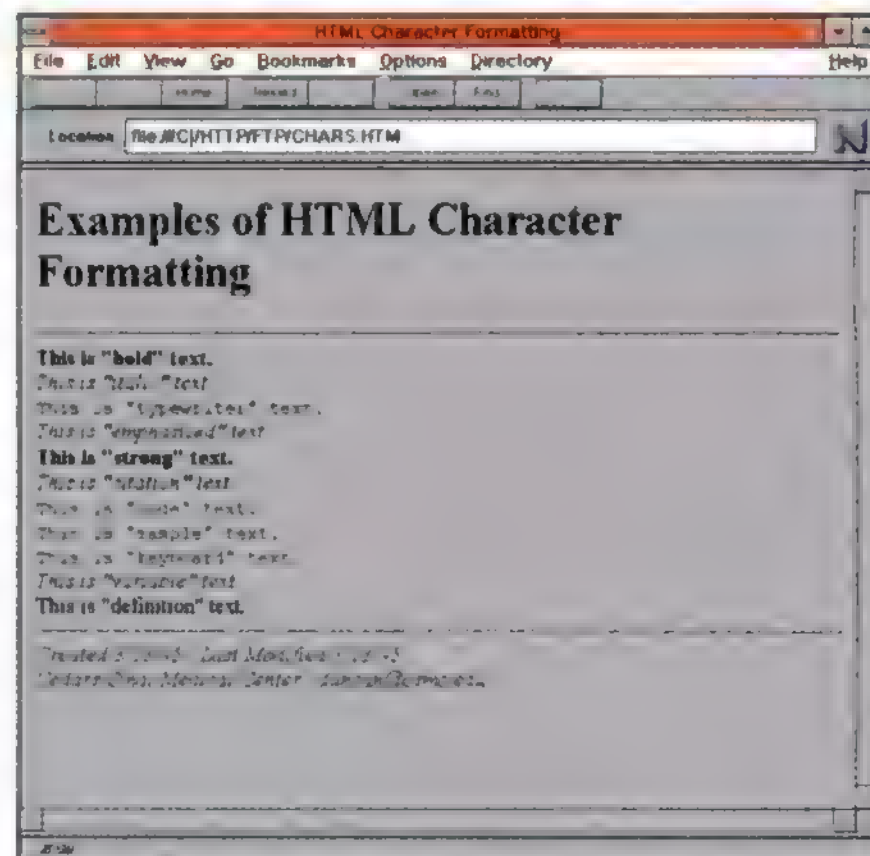


Figure 4: These examples of character formatting were produced on a Web browser by the HTML code in Figure 3.

urable), you can be assured that `<H1>` tagged text will be larger and more conspicuous than `<H2>` tagged text, which in turn will be more prominent than `<H3>` tagged text, and so on.

The heading tags have an important effect on text flow. When a heading tag is encountered, the current paragraph is terminated and the heading text is displayed left-aligned in a visually distinct font with extra white space preceding and following the heading; text flow is then resumed at the left margin. The amount of white space above and below the heading is approximately equivalent to one line height of the same font as the heading. You can format additional white space around a heading by inserting `<P>` tags before or after the tags that bound the heading text, but there is no way to reduce the white space around a heading.

Figures 1 and 2 demonstrate the various levels of headings, as seen on a plain-vanilla Windows 3.1 system running the Netscape Navigator browser.

CHARACTER-FORMATTING TAGS The character-formatting tags can be divided into two subgroups: physical character-attribute tags and logical character-attribute tags. The tags are always paired, and you insert them directly into the character stream; they do not affect indentation, spacing, or line breaks. The physical attribute tags are equivalent to the formatting you'd apply in a word processing program:

<code></code>	Boldface
<code><I></code>	Italic
<code><U></code>	Underline
<code><TT></code>	Teletype text--non-proportional font (Courier)

For example, the text sequence

The third `<B>word</B>` in this `<I>sentence</I>` is in boldface, and the sixth is in italic.`<P>`

would be displayed as

The third **word** in this *sentence* is in boldface, and the sixth is in italic.

```
<HTML>
<HEAD>
<TITLE>HTML Ordered and Unordered Lists</TITLE>
</HEAD>
<BODY>
<H1>This is an Unordered (Bulleted) List</H1>
<HR>
<UL>
<LI>This is the 1st item.
<LI>This is the 2nd item.
<LI>This is the 3rd item.
</UL>
<HR>
<H1>This is an Ordered (Numbered) List</H1>
<HR>
<OL>
<LI>This is the 1st item.
<LI>This is the 2nd item.
<LI>This is the 3rd item.
</OL>
<HR>
<ADDRESS>
Created 3/13/95 / Last Modified 3/13/95<BR>
Cedars-Sinai Medical Center / duncan@csmc.edu
</ADDRESS>
</BODY>
</HTML>
```



Figure 5: This HTML source code demonstrates HTML ordered (numbered) and unordered (bulleted) lists.

The logical character-attribute tags are more abstract and more numerous, and are roughly analogous to the "character styles" in a word processor:

<code><ADDRESS></code>	Contact information for author of the HTML document
<code><CITE></code>	Citation
<code><CODE></code>	Used for HTML directives
<code><DFN></code>	Definition
<code></code>	Emphasis (often italic)
<code><KBD></code>	Keyboard character
<code><SAMP></code>	Sample output of a command
<code></code>	Strong emphasis (boldface)
<code><VAR></code>	Program variable

When you use a logical character-formatting tag, you really don't have any way to predict what a particular Web browser will do with it. At the present time, most browsers map the various logical tags to `<B>`, `<I>`, or `<TT>`, and otherwise don't give them any special attention. On the other hand, use of the logical styles opens up many possibilities over the long run, because the tags tell the browser something about the nature of the text as well as its appearance. So Web authors are encouraged to use logical character-formatting tags rather

than physical tags whenever possible.

By the way, it may be tempting to try and use character-formatting tags in combination, like this: `<B><I><U>Some Text</U></I></B>`. After all, it's perfectly routine to apply multiple character attributes to text in a word processor! But the behavior of Web browsers in response to such sequences is not guaranteed: Some may valiantly attempt to do what you ask, some will just pick one of the attributes arbitrarily and apply it, and some might even do nothing. My advice is to avoid using character tags in combination.

Figures 3 and 4 show examples of the character-formatting tags and their results.

LIST-FORMATTING TAGS HTML, Versions 0.9/1.0 and 2.0, support three types of lists: ordered lists, unordered lists, and definition lists, created with the paired tags `<OL>`, `<UL>`, and `<DL>` respectively. Ordered lists are intended for sequential operations or algorithms, and the Web browser automatically generates numbers for each item in the list. Unordered lists are used for simple shopping lists of items where order is irrelevant, and each item in the list is displayed with a preceding bullet. Definition lists provide a specialized dictionary-like or glossary-like formatting for terms and their associated descriptions.

Individual items within an ordered or unordered list are flagged with the singleton tag `<LI>`, and items within `<DL>` lists are delimited by `<DT>` and `<DD>` tags to

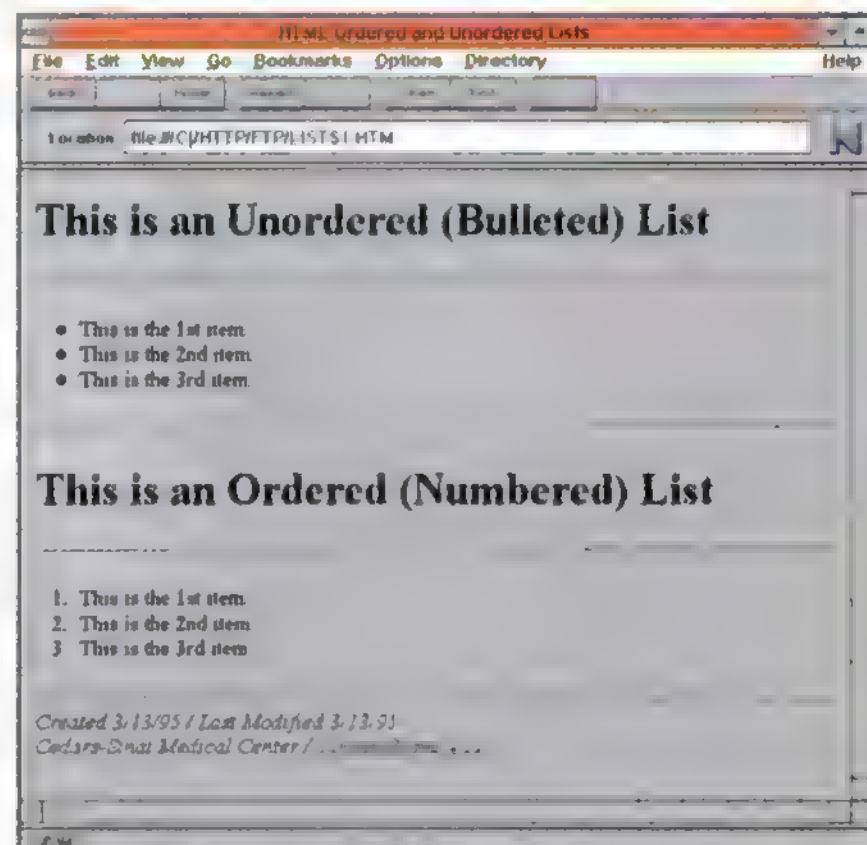


Figure 6: These ordered (numbered) and unordered (bulleted) lists were produced by the HTML code in Figure 5.

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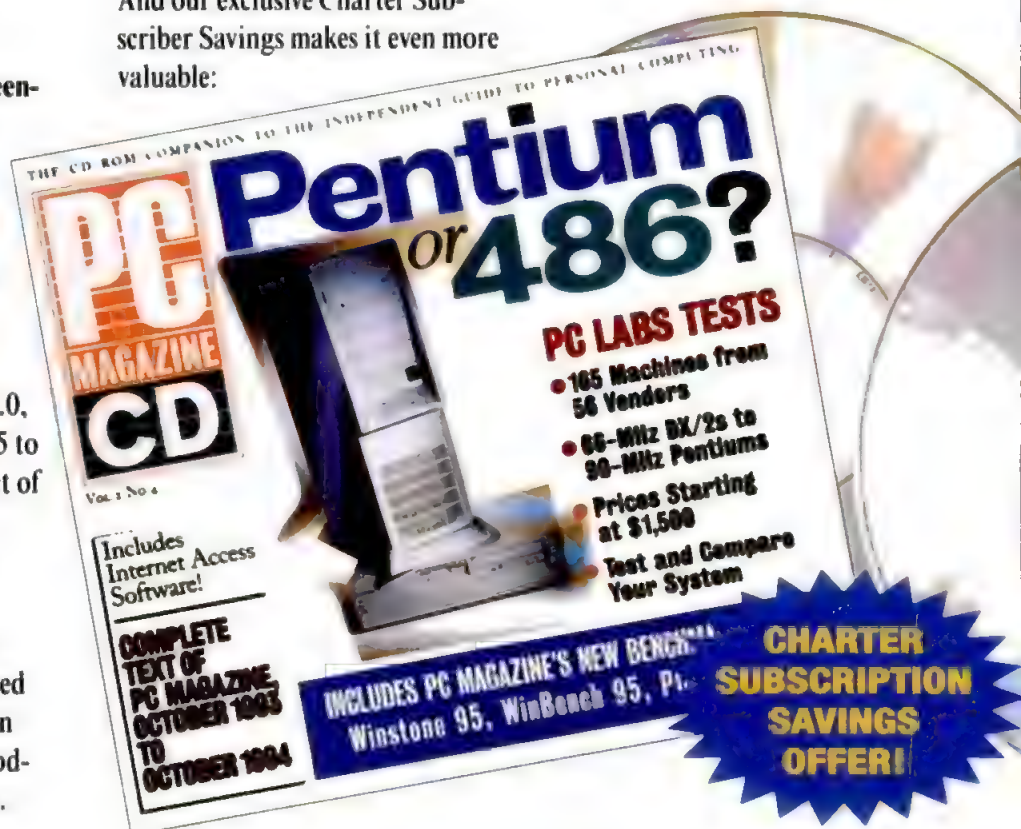
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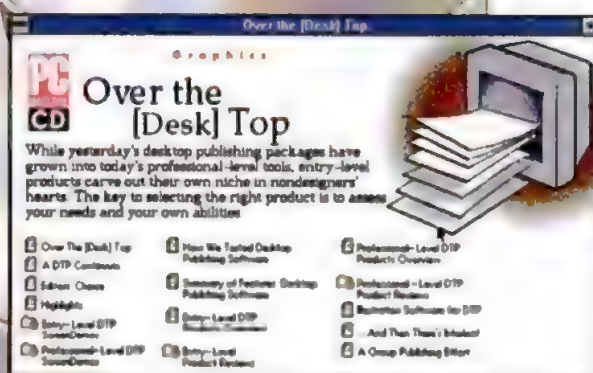
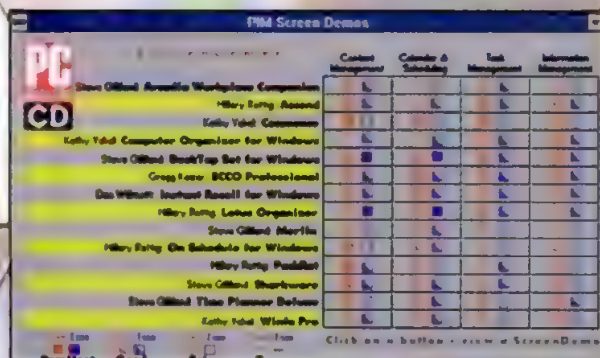
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mark the term and definition, respectively. For example, the HTML sequence

```
<UL>
<LI>Here is a list item.
<LI>Here is another item.
<LI>Here is the last item.
</UL>
```

would be rendered as

- Here is a list item.
- Here is another item.
- Here is the last item.

Nested lists are fully supported, and some browsers even make an attempt to use a reasonable hierarchy of differently shaped or colored bullets for unordered lists. Hanging indents, spacing, and other critical aspects of lists are not under the author's control, unfortunately. In the current versions of HTML, lists are about the only way to present highly structured information attractively, but they are really a pretty weak construct. As HTML 3.0 comes into widespread use, along with Web browsers that fully support the HTML 3.0 table facilities, we can expect to see many of the current uses for list tags fade away.

Additional examples of the various types of lists can be found in Figures 5, 6, 7, and 8.

SPECIAL CHARACTERS The HTML specification defines the character set for HTML documents to be the ISO 8859/1 8-bit single-byte-coded graphical character set, also known as Latin Alphabet No. 1 or Latin-1. This is a 256-character set that includes many graphic elements and the accented characters needed for text written in the most widely used European languages as well as English. The lower 128 character codes of ISO 8859/1 are essentially the same as the ASCII character set, and this subset is sometimes referred to as the International Reference Version or ISO-646.

In practice, most HTML documents are implemented in lowest-common-denominator ASCII because of keyboard limitations and for purposes of portability across CPU and operating system platforms. But many symbols commonly needed in electronic publishing, such as accented or otherwise modified charac-

```
<HTML>
<HEAD>
<TITLE>HTML Nested and Definition Lists</TITLE>
</HEAD>
<BODY>
<H1>This Demonstrates Nested Lists</H1>
<HR>
<UL>
<LI>This is the 1st item.
<UL>
<LI>This is a nested bulleted item.
<LI>This is another nested bulleted item.
</UL>
<LI>This is the 2nd item.
<OL>
<LI>This is a nested numbered item.
<LI>This is another nested numbered item.
</OL>
<LI>This is the 3rd item.
</UL>
<HR>
<H1>This is a Definition List</H1>
<HR>
<DL>
<DT>This is the first term.
<DD>This is a description of the first term. The description can be
very long. This is more description of the first term.
<DT>This is the second term.
<DD>This is a description of the second term. The description can be
very long. This is more description of the second term.
</DL>
<HR>
<ADDRESS>
Created 3/13/95 / Last Modified 3/13/95<BR>
Cedars-Sinai Medical Center / duncan@csmc.edu
</ADDRESS>
</BODY>
</HTML>
```



Figure 7: This HTML source code demonstrates nested lists and definition lists.

ters, currency symbols, and the trademark and copyright symbols, are not included in the ASCII character set. Additionally, we need some way to display characters that would otherwise be interpreted as part of an HTML formatting command: < (less than), > (greater than), & (ampersand), and " (double quote).

To meet these display needs, HTML defines special "escape sequences" that you can use to encode non-ASCII glyphs and HTML command delimiters. The HTML specification refers to these special escape sequences as *character entities*, which has a faintly Star Trekish ring about it. Here are a few of the more important symbolic escape sequences:

Escape Sequence	Displays As
<	<
>	>
&	&
"	"

Special characters can also be encoded with a numeric escape sequence, where

the number corresponds to the ISO 8859 code for the character. For example:

Escape Sequence	Displays As
<	<
>	>
&	&
"	"
©	©
®	®

The full list of escape sequences is quite lengthy; the best reference for it is the HTML 2.0 specification, which is available in hypertext at many different locations on the World-Wide Web (try <http://info.cern.ch> as a starting point).

Note that the special-character escape sequences are case sensitive, according to the HTML specification. But some browsers (including Netscape Navigator) will honor the tags in uppercase as well as lowercase.

IN-LINE GRAPHICS TAGS One of the most compelling aspects of the World-Wide Web is its "multimedia" capability;

that is, the ability to merge pictures, icons, video clips, and sound seamlessly with the supporting text and present the result in a visually rich, attractive, and integrated manner. This fundamental graphical orientation is the main reason, I believe, that the World-Wide Web exploded out of nowhere during 1994 and virtually overnight eclipsed its text-only predecessors, the slow-growing worldwide network of Gopher servers and clients.

The smooth integration of graphics perceived by the user of a Web browser, however, is more apparent than real. From the document author's point of view, proper handling of graphics is enormously time-consuming. There are image acquisition and ownership issues, there are aesthetic issues, there are hyperlink validation issues, there are technical issues of image formats and palette mapping, and last but not least, there are extremely important performance issues.

At the simplest level, graphics elements are *in-lined* with text by use of the tag. The tag includes a URL that specifies the actual location of the graphics object in a separate file and some optional display-tweaking information. In other words, the graphic is not actually embedded into the HTML document but is incorporated by reference. The URL may be absolute or relative, so the image may reside on the same system as the HTML document that refers to it, on any other addressable Web server, or even on the user's local hard disk. The full form of the tag is

```
<IMG SRC="URL" [ALIGN=TOP|MIDDLE|
BOTTOM] [ALT="text"]>
```

When the user views the HTML document, the browser will retrieve any graphics objects referred to by the document in separate transactions, then merge them into the displayed text according to the optional alignment parameter, with the default alignment being BOTTOM. The optional ALT parameter specifies text to be displayed in place of the graphic for character-mode-only Web browsers such as Lynx. Most graphical browsers can handle several types of in-line images, including JPEG files, X bitmaps, and

CompuServe .GIF files. The predominant image type is .GIF, although this may change rapidly over the next year because of recent legal skirmishes.

Let's look at a simple example of an in-line graphic. The following sequence in an HTML document would result in display of the graphics file JOHN-DOE.GIF at the left margin of the browser window, with the text "John Doe" displayed on the right side of the graphic and with the text baseline aligned with an imaginary vertical halfway mark on the graphic.

```
<P>
<IMG SRC="JOHNDOE.GIF" ALIGN=MIDDLE>
John Doe<P>
```

Notice that the graphics file's URL is relative, so the browser will try to retrieve the graphics file from the same location as

 tag!" More subtle errors can also occur, as when the content of a graphics file is updated or completely changed after the creation of the HTML document that references it, or when a filename collision on the remote system or an error in URL coding results in display of the wrong graphic. As more sophisticated Web authoring systems emerge, this sort of problem will no doubt become less significant.

Performance issues, on the other hand, will be with us for the foreseeable future. A few kilobytes of HTML-coded text may translate to several pages of formatted text on the screen, but even the teensiest 256-color graphic object other than an icon is usually at least a few kilobytes, and a full-screen graphic can easily require over 100K. You can well imagine, therefore, that heavy use of graphics in a document will degrade

browser performance enormously, especially if the user is accessing the Internet via a 14.4-Kbps modem and a SLIP connection, or via a 56-Kbps leased line.

The first widely used Web browser, Mosaic 1.0.3, did not allow the user to do anything until all the graphics referenced in an HTML document had been downloaded, unless image loading was disabled altogether. At the time I first started using Mosaic, my company had only a relatively low-grade (56-Kbps) connection to the Internet backbone. I remember gnashing my teeth frequently as I waited for Mosaic to display Web documents splattered

throughout with icons and large maps and pictures, written by thoughtless authors who were working on machines with multimegabit hardwired connections to the Internet and who assumed everyone else in the world had the same privileged access.

Second-generation Web browsers, such as Netscape Navigator, have circumvented the graphics-performance problem to some extent by placing graphics retrieval in "background threads," allowing the user to scroll through the text of a document or jump to another document be-

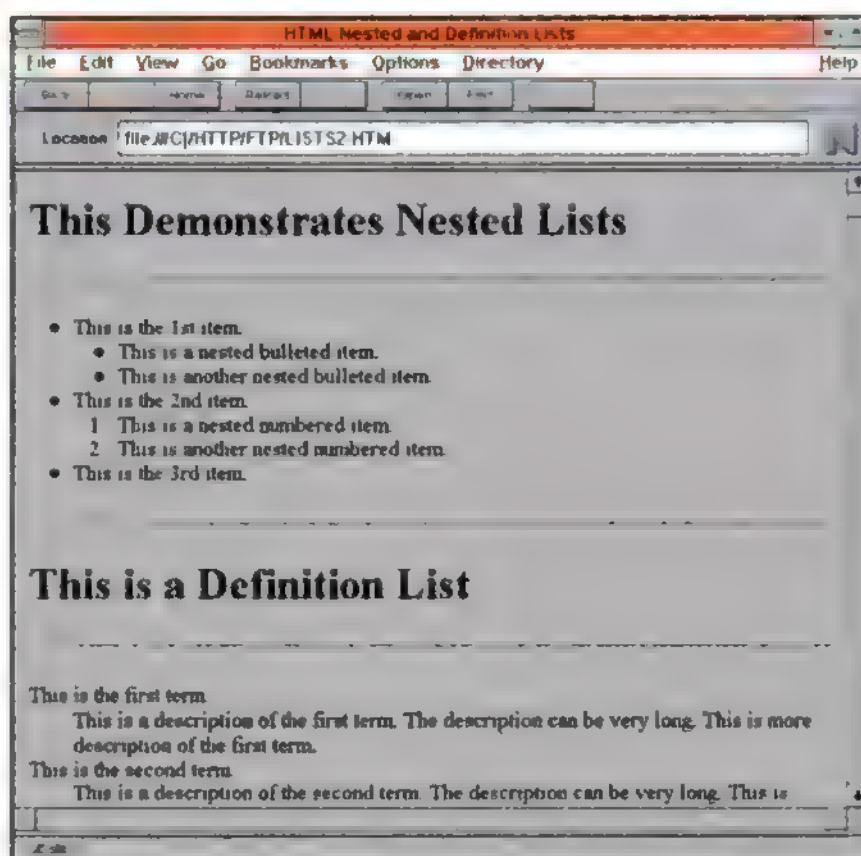


Figure 8: These nested and definition lists were produced by the HTML code in Figure 7.

it got the HTML document file that referred to the graphic.

URL-validation and graphics-performance issues are the bane of multimedia Web publishing. Because HTML documents and their in-line graphics actually reside in separate files on the Web server, it is easy for documents and the names or locations of their associated graphics elements to get out of sync. When surfing the net, you will frequently see your Web browser render some in-line graphic as a generic icon, meaning "I can't find this puppy at the URL specified by the

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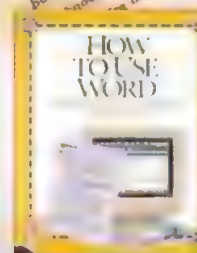
1-800-688-0448,
ext. 259 for more information.

How to Use the Mouse in Windows

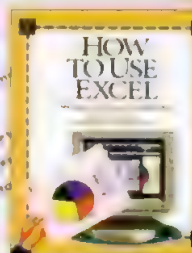
A mouse is a device that is used to control the cursor on the screen. It is the most common input device. A mouse is a small, hand-held device with a cord that connects to the computer. It is used to point at and click on objects on the screen. Although it's possible to get by without a mouse, it's not too wise. The Windows interface was designed with the mouse in mind. Keyboard alternatives can be awkward. It's not always easy to find out what they are. Take a few minutes to learn yourself with a mouse and you'll reward yourself with another computing.

TIP SHEET

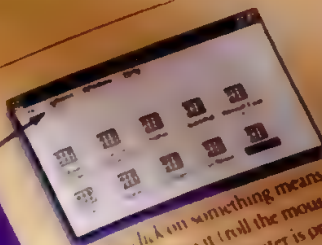
- Unless told otherwise, use the left mouse button. The other mouse buttons are used so infrequently that when they are used, they are always told about it.



ISBN: 184-6
Price: \$17.95



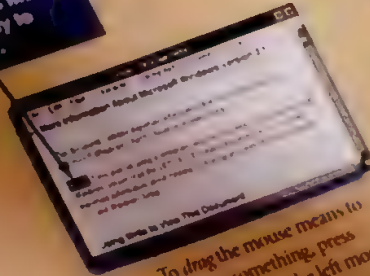
ISBN: 185-4
Price: \$17.95



2

To click on something means to point to it (roll the mouse so the mouse pointer is on top of it) and then press and instantly release the left mouse button. To double-click on something means to point to it and then click the left mouse button twice in rapid succession.

Drag across a word to select it. Then press the Delete key to delete it.

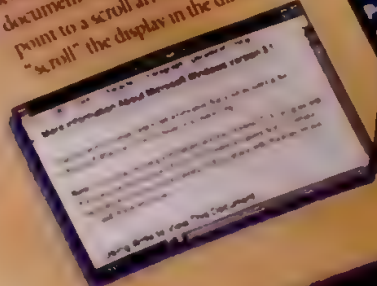


3

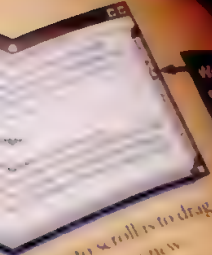
To drag the mouse means to point to something, press and hold down the left mouse button, roll the mouse, and then release the mouse button. For example, you can "select" a block of text for deletion by dragging from one end of the block to the other.

4

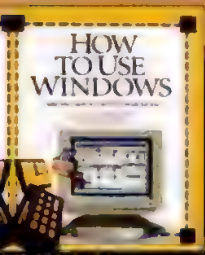
Scrolling is one of the most common mouse actions. When a document window cannot accommodate all its contents at once, point to a scroll arrow and hold down the left mouse button to "scroll" the display in the direction of the arrow.



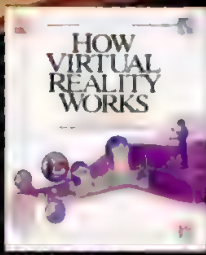
Point here and hold down the left mouse button to scroll down through the document.



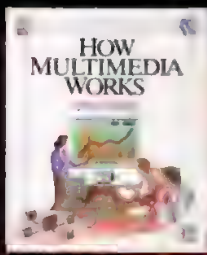
Another way to scroll is to drag the scroll button to a new position along the scrollbar. The position of the scroll button suggests what part of the contents you are viewing.



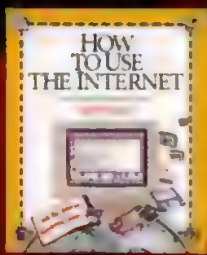
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fore the graphics elements have been completely downloaded. But as a Web document author, you can best address the graphics-performance issue by using graphics elements only where they are really needed and by judicious use of in-line "thumbnail" images that are hotlinked to the full-size graphics.

ANCHOR TAGS Anchor tags are used to encode hyperlinks, the colored or underlined chunks of text or bitmaps with a special border that users can click on to jump to another document or to another location in the same document. The basic form of a hyperlink anchor tag is

```
<A HREF="URL">some text here</A>
```

where "some text here" is what the user sees, and the URL is the "destination" of the hyperlink. The URL can be *absolute*, containing the full hostname and filename of the target document; *relative*, meaning the hostname and starting directory for the path is assumed to be the same as the document containing the anchor tag; or even *local*, indicating a file re-

siding on the machine running the Web browser rather than on the Web server. Between the <A> and tags you can insert any amount of text, an tag for an in-line graphic, or a combination of the two.

Ordinarily, when a user clicks on a hyperlink, the destination document is retrieved by the browser, formatted, and then displayed starting at the top in a scrollable window. But the anchor tag provides the option of immediately scrolling to a label within the target document. The general form for this type of anchor tag is

```
<A HREF="URL#label">some text here</A>
```

The label must be encoded in the destination HTML document with an anchor tag that takes the form

```
<A NAME="label">user-visible text here</A>
```

Support for labels in HTML docu-

ments introduces the possibility of hyperlinks that merely cause the browser to reposition itself within the document currently being displayed. Such anchor tags have the form

```
<A HREF="#label">some text here</A>
```

Note the absence of the URL and the presence of the mandatory # character. This type of hyperlink has become quite popular in Web documents, which often start out with a document outline (implemented as an ordered or unordered list) wherein each element is actually an anchor tag that causes a jump to the corresponding section of the document. The only unfortunate aspect of such same-document hyperlinks is that the Web browser's Back button never has the effect that you expect!

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Utilities

BY NEIL J. RUBENKING

Change a Program's Address with COA

Once you install a Windows application on your system, it becomes enmeshed in a complicated web of connections that conspire to keep it in its original home directory. If you change your directory structure or move the program to a new directory, you'll find that references in .INI files, Program Manager .GRP files, and possibly the registration database still point to the old location, rendering the program unusable. You'll have the same problem if the drive letter changes because you've added or removed a hard disk, a partition, or a RAM drive (for applications on CD-ROM). Because the program's old address is still referenced throughout your Windows setup, Windows can't find the program at its new address.

Change of Address (COA), this issue's utility, effectively sends change-of-address notices to Windows. It will change one address string to another address string in your .GRP and .INI files, and in the registration database as well. If you don't want COA to spend time searching every .GRP and .INI file, you can use the supplied viewers to browse files and choose only those that contain the string that needs to be changed. If you prefer to make changes manually, you can use the provided .GRP and .INI file editors. At any point, the F1 key will bring up context-sensitive help.

You can obtain COA and its source code at no cost either by downloading the files from ZiffNet's PC MagNet or the Internet, or by mail. Refer to the sidebar "Guide to Our Utilities & How to Get Them" for the details. Programmers may be particularly interested in looking at the

code for COA, because it was written in Borland's new Pascal-based visual development tool, Delphi.

USING COA To install COA, simply place the two program files, COA.EXE and COA.HLP, into the directory of your choice and use Program Manager to create an icon for COA. That's all you have to do! To uninstall COA, delete COA.EXE and COA.HLP, along with COA.INI in your Windows directory.

COA is an MDI (Multiple Document Interface) program, like Program Manager and File Manager. Inside its main window you'll find child windows of several different types. Three windows in particular are always present: the File List window, the Find and Replace window, and the Registration Database viewer window (see Figure 1). If you try to close one of these, it will simply shrink to an icon at the bottom of the main window. When you shut down COA, the size and position of

the main window and of these three windows are stored in COA.INI. Next time you run the program, the main window and the three child windows are restored to their saved sizes and positions.

The Find and Replace window is the actual change-of-address form at the heart of COA. This is where you fill in the old address to be sought and the new address with which to replace it. When you've filled in a value for both of these, the DO IT button is enabled. Clicking on this button without any further action will cause COA to perform its find-and-replace operation on the registration database alone.

The items in the main window's Options menu control the way COA searches for and replaces text. If you check Match Case, COA makes the replacement only if the text matches exactly. With this option checked, "CAT" does not match "Cat." If you check First Only, COA makes the change only if the Find string is at the very start of the .INI key value or .GRP file item being processed. With this option checked, "dog" would not be found in "endogamy."

If you check Confirm Replace, COA asks for permission before making each replacement (see Figure 2). You can accept or reject each matched string individually by choosing Yes or No, or you can accept all remaining replacements in the current file by choosing All. You also can quit processing the current file by choosing Cancel. Last on the Options menu is Flyover Help. Remove the check next to this item to turn off the tiny help windows that pop up to explain the component on which the mouse cursor is resting. These help windows are handy at first, but they can get annoying once you're familiar with the program.

Normally you'll want to process .INI and .GRP files as well as the registration database. That's where the File List window comes in. When this window is active, a List menu item appears on the menu bar. Press the Plus speed button or choose Add Files from the List menu to select files for processing. A standard Windows common dialog box will appear, initially displaying all the .GRP and .INI files in your Windows directory, and you can choose one or more files from the list. To select all .GRP and .INI files in a di-

Top 10 Utilities

Rank	Filename
1	FDDLs—Finds and removes dead DLLs
2	INCTRL—Oversees program installation
3	FINDIR—Analyzes IRQ line usage
4	WTIM—Keeps PC clock time accurate
5	WINCMD—A Windows batch language
6	MYGRPS—Customizes group icons
7	SLICE—Slices large files for copying
8	BUGS—A Windows 3.1 screen saver
9	SCHED—Schedules program execution
10	PLICON—Places icons where you want

This list is based on the total number of downloads each utility has had on PC MagNet over the past month. To download these files, type GO ZNT:TIPS. For more information, see the sidebar "Guide to Our Utilities & How to Get Them."

rectory, click on the first file, scroll to the bottom of the list, and Shift-Click on the last file. Press the Minus speed button or choose Remove Files from the List menu to remove the highlighted file. Press the Clear (empty box) speed button or choose Clear List to clear the list entirely.

Now when you press the DO IT button, COA processes each of the files from the File List window and then handles the registration database. The status bar at the bottom of the Find and Replace window reports what's currently being processed. Note that if you have not checked Confirm Replace on the Options menu, you won't have an opportunity to stop the process once it has started.

PICKING AND CHOOSING If your Windows directory holds the usual hundreds of .INI files and dozens of .GRP files, pro-

cessing all of them could take a little while. It may be more practical to spend a moment determining which files need to be changed. There are three ways to activate the viewer: activate the File List window and double-click on a filename, highlight the name and press the Browse (magnifying glass) speed button, or choose Browse File from the List menu. An outline-style viewer window will appear with the selected file loaded into it (see Figure 3).

The .INI file viewer displays all non-blank lines from the .INI file, including comments. You can use the viewer to determine whether, for example, BP.INI goes with Borland Pascal or Bicycle Poker. The .GRP file viewer lists the program items in the group along with three strings for each item: the command, the working directory, and the name of the file containing the program item's icon.

The registration database viewer has an extra speed button labeled Load. Loading the registration database can be slightly time-consuming on slower systems, so COA doesn't do it automatically. Press Load when you want to view the registration database.

The two file viewers and the registration database viewer all work in precisely the same way—in fact, they're implemented using the same module of code. When one of these windows is active, a Viewer menu appears on the menu bar.

The Expand All and Collapse All choices serve to fully expand or fully collapse the outline. Once you've filled in the Find What string in the Find and Replace window, you can search for the string within the viewer. Choose Find from the Viewer menu (or use the Find speed button) and COA highlights the next line that contains the string. If COA reaches the end of the outline without finding the search string, it starts again at the beginning.

Another way to fill in the Find What line is to select a line in the viewer and choose Grab Line from the Viewer menu or use the Grab Line speed button. This will copy the significant part of the currently selected line to the Find and Replace window's Find What line. Another way to copy information from the viewer is to drag a line from the outline to the Find and Replace window's Find What line or Replace With line.

You can also manipulate the outline using mouse and keyboard techniques similar to those you use in File Manager. Double-click on an item marked with a

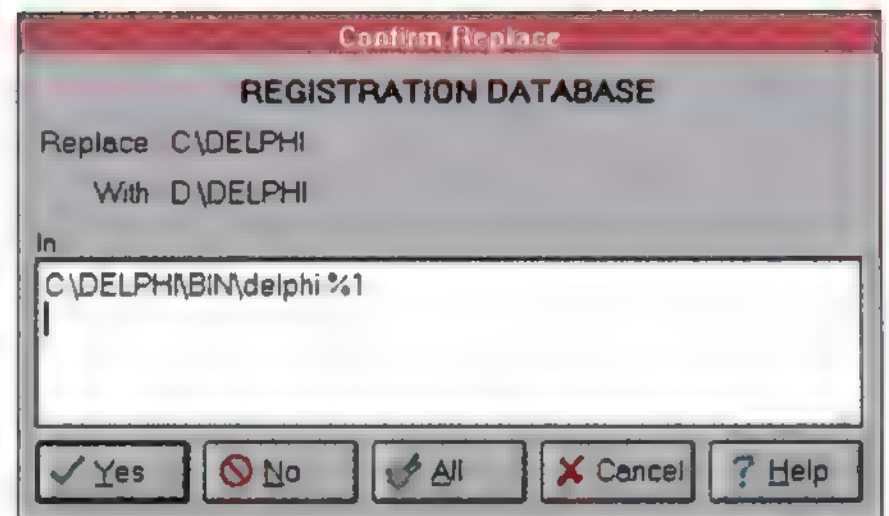


Figure 2: When you choose the Confirm Replace option, you can accept or reject changes for each string match individually, or for the remainder of the current file.

closed folder to expand that branch of the outline, or double-click on an open folder to collapse the branch. From the numeric keypad, the Minus key collapses a branch, the Plus key expands a branch by one level, and Shift-Asterisk fully expands a branch.

EDITING .GRP AND .INI FILES When you press the DO IT button, COA will automatically update the registration database and any .GRP and .INI files you've selected. COA also allows you to change .INI files and .GRP files manually rather than with a global find-and-replace operation.

As with the viewer, there are three ways to open a file's editor window: Shift-Double Click on the file in the File List window, highlight the file and press the Edit speed button (which displays a writing hand), or choose Edit File from the List menu. You can also choose .GRP Editor or INI Editor from the File menu to select and edit a file without adding it to the File List window. When you save a modified .GRP or .INI file, COA stores the original as a backup, using the extension .GR or .IN.

The .INI file editor is similar to the .INI file viewer, with the addition of an edit box for changing the value of the highlighted key and a menu for inserting and deleting sections and keys. It also supports reordering keys in a section or sections in the file using drag-and-drop. Windows doesn't care about the order of the keys or sections, but you may want to put the most important sections at the start of the file and the most important keys at the start of their section.

The .GRP file editor is another story. Figure 4 shows COA's .GRP file editor

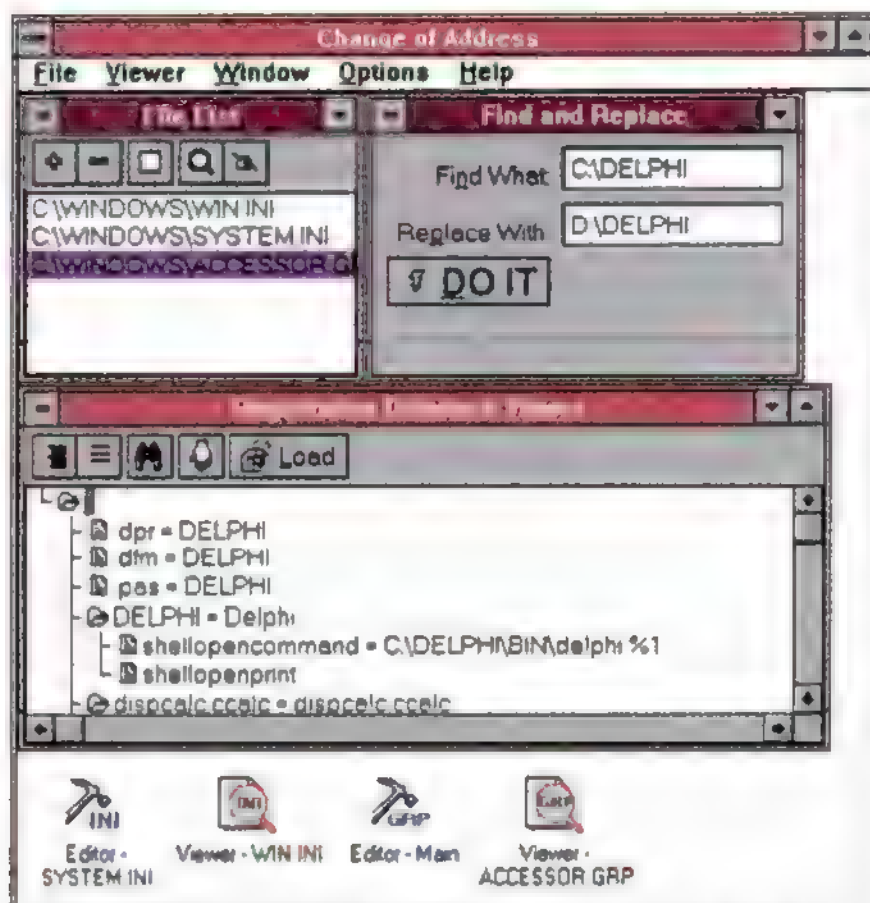


Figure 1: Three windows are always present when COA is running: the File List window, the Find and Replace window, and the Registration Database viewer.

The .GRP file editor is another story. Figure 4 shows COA's .GRP file editor

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CIRCLE 127 ON READER SERVICE CARD

window. Editing .GRP files is a tricky business; one mistake and Program Manager will reject the changed file. To prevent this from happening, COA allows you to edit only the same three lines that it displays in the viewer; it shows the rest of the .GRP file's data in read-only form.

The title bar contains the name that Program Manager uses for the group window, which may or may not be related to

items in Program Manager's Program Item Properties dialog box. COA displays these values exactly as they're stored in the .GRP file, while Program Manager actually exchanges the path portion of the Command Line with the Working Directory when storing this information.

Icon path is the name of the file containing the icon used for the program. For Windows applications, this will normally be the executable file itself, but for DOS programs the icon may be taken from PROGMAN.EXE, MORICONS.DLL, or any file that contains icons. Icon Index is the zero-based index of the icon within the file. If the file contains just a single icon (such as TAPCIS.ICO), then the index is 0. In Figure 4, the DOS prompt item is using icon number 9 from PROGMAN.EXE.

A synchronization problem could arise if you leave an editor window open while performing a find-and-replace operation. The editor window would hold the file's old contents, possibly with some changes made by the user. Saving the editor window's contents would overwrite COA's careful work. For clarity and safety, COA automatically closes all .GRP and .INI file editors and viewers before it performs its find-and-replace operation.

INSIDE COA COA is the first *PC Magazine* utility written in Delphi, Borland's new visual programming product. At design time, Delphi looks a lot like Visual Basic. You create forms, drop "components" (the Delphi equivalent of VB's controls) on forms, set property values for forms and components, and write code to respond to events like mouse clicks, keystrokes, or form creation.

However, the underlying language is object-oriented Pascal, not BASIC. Delphi compiles programs to native machine code, where VB compiles to interpreted pseudo-code, so Delphi programs will tend to run faster. All the components required by a Delphi program are bound into the .EXE file. As a result, the .EXE

file is larger than a VB .EXE file, but it avoids the need to drag around a flock of supporting files that may conflict with existing versions on the user's machine. But enough about Delphi; let's dip into some of the more interesting programming topics within COA.

THE REGISTRATION DATABASE If you've never looked at the registration database, you may be surprised by the amount of information stored there. Windows uses this information in the process of associating files with programs and managing OLE communication. The data is stored in a hierarchical form in which each item, called a *key*, may have multiple subkeys but just one parent.

The structure is similar to a DOS directory tree, and it maps perfectly onto Delphi's outline component. The outline component is designed to hold and display hierarchical information. Every item in the outline can have any number of child items, but just one parent. The ability to expand and collapse branches of the outline display is built into the component.

Windows provides a host of specialized API functions for reading and changing the registration database. To step through the subkeys of a given key, for example, you call RegOpenKey to get a handle to the starting key, repeatedly call RegEnumKey to get all the subkeys, and then call RegCloseKey to release the

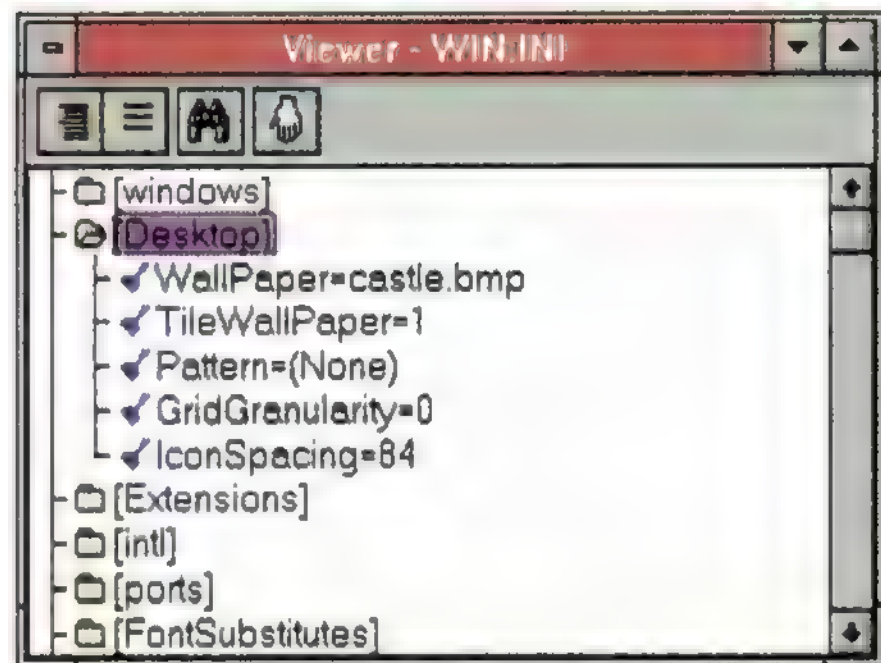


Figure 3: COA outline-style viewers let you browse .INI files, .GRP files, or the registration database; this viewer is displaying WIN.INI.

the .GRP filename shown below it. General information about the group is displayed at the top of the window. Normal Rectangle shows the coordinates of the group window within Program Manager when the group is neither minimized nor maximized, and Minimized Location shows where the group's icon is within Program Manager when it's minimized. Finally, a drop-down combo box lists all of the program items contained in this group window.

The lower panel displays information about the program item currently selected in the combo box, including a picture of its icon. Location is the item's position in the group window, and Minimized is true only if the item is set up to run minimized. If you've defined a Program Manager hotkey for the item, its numeric value and a descriptive string will be displayed.

The three items you can edit are the command line, the icon path, and the working directory. Command Line is the command that gets executed when you double-click on the icon, and Working Directory is the directory in which Windows will start the program. Note that these do not precisely match the same-named



Figure 4: Here the Main group is loaded into a .GRP file editor. The upper panel displays data about the group as a whole, and the lower panel displays data about the selected item, MS-DOS Prompt.

starting key's handle. Closing every key you open is essential, because any changes to the registration database won't be finalized until the last key handle is released. The constant HKEY_CLASSES_ROOT represents the root node of the registration database hierarchy.

Some keys have a value associated


```

procedure TGenViewer.SpeedBtnLoadClick(Sender: TObject);
VAR
  LastItem : LongInt;

PROCEDURE OneKey(hkFrom : hKey; SubKey : PChar; CurParent : LongInt);
VAR
  hkNew      : hKey;
  buff, value : ARRAY[0..80] OF Char;
  Index      : LongInt;
  ValSize    : LongInt;
BEGIN
  IF RegOpenKey(hkFrom, SubKey, hkNew) = ERROR_SUCCESS THEN
    BEGIN
      Index := 0;
      WHILE RegEnumKey(hkNew, Index, buff, 80) = ERROR_SUCCESS DO
        BEGIN
          ValSize := 80;
          RegQueryValue(hkNew, buff, value, valSize);
          IF ValSize < 2 THEN
            Outline1.AddChild(CurParent, StrPas(buff))
          ELSE
            Outline1.AddChild(CurParent, StrPas(buff) + ' = ' +
              StrPas(Value));
          LastItem := LastItem + 1;
          OneKey(hkNew, buff, LastItem);
          Index := Index + 1;
        END;
      RegCloseKey(hkFrom);
    END;
  END;
begin
  IF AlreadyLoaded AND (Sender = SpeedBtnLoad) THEN
    IF MessageDlg('Registration database is already loaded. ' +
      'Reload?', mtConfirmation, [mbYes, mbNo, mbHelp], 1) <> IDYES THEN
      Exit;
    Outline1.Clear;
    Outline1.Add(0, '\');
    Application.ProcessMessages;
    LastItem := 1;
    Cursor := crHourglass;
    Outline1.BeginUpdate;
    OneKey(HKEY_CLASSES_ROOT, NIL, 1);
    Outline1.FullExpand;
    Outline1.EndUpdate;
    Cursor := crDefault;
    AlreadyLoaded := TRUE;
  end;

```



Figure 5: This event handler from GENYUU.PAS loads the registration database into an outline.

with them. The RegQueryValue function returns the value for a particular key along with the value's length. A length less than 2 indicates that this key does not have a value. For a key that does have an associated value, the RegSetValue function sets a new value.

Figure 5 shows the OnClick event handler for the Load button in the registration database viewer. This method uses a recursive function to load the registration database into a Delphi outline, using the registration database API functions.

The event handler first checks whether this is a second press of the Load button and, if so, asks for confirmation before proceeding. It clears the contents of the outline, adds a root node consisting of a single backslash, and calls Application.ProcessMessages (the equivalent of Do-

Events in Visual Basic) to allow Windows a chance to reflect these changes on-screen. In preparation for reading the database, the event handler sets the local variable LastItem to 1, changes the cursor to an hourglass, and calls the outline component's BeginUpdate method.

The BeginUpdate method prevents the outline from updating its internal structures and repainting the screen every time a new item is added. All such changes are postponed until the EndUpdate method is called. This includes the calculations that allow the AddChild method to return the index of the item it just added, which is why the event handler has to use the LastItem variable to keep track of the last item's index!

The recursive function OneKey actually reads the registration database.

OneKey's hkFrom argument, in this case HKEY_CLASSES_ROOT, is the key handle to be processed. The SubKey argument, initially NIL, is the name of the subkey. The CurParent argument, initially 1, is the index of the outline item to which this key should be attached.

Within OneKey, a call to RegOpenKey opens the key, and a WHILE loop calls RegEnumKey repeatedly to process all subkeys. If a particular subkey has a value, a string consisting of the key text, an equal sign, and the value is added to the outline below the item specified in the CurParent argument. If the subkey has no value, the key text alone is added to the outline.

After adding a key, OneKey increments the LastItem local variable so that it contains the index of the new last item in the outline. Now OneKey calls itself, passing the subkey's handle, its key text, and LastItem. This recursive call processes all the subkeys of the current subkey and adds them to the outline beneath the current subkey. After processing of a given key's subkeys is complete, OneKey calls RegCloseKey to release the key handle. When the very first call to OneKey finally ends, the last open key handle is released.

A very similar recursive function, also named OneKey, in REPFORUM.PAS (the code unit associated with the Find and Replace window) handles COA's find-and-replace operation in the registration database. The RegOpenKey, RegEnumKey, RegCloseKey cycle is the same. However, in addition to getting each key's value, this version of OneKey calls the StrChange function in MY-STRING.PAS to process the value. If a replacement was made, RegSetValue is called to put the new value in the registration database.

EDITING .INI FILES Loading an .INI file into the .INI file editor's outline component is vastly easier than reading in the registration database, because this outline has only two levels. The section headings are all top-level outline items, and the keys and comments in each section are placed below that section.

You might expect a program that reads .INI files to use the Windows API functions for that purpose or their Delphi equivalents. However, neither GetPri-


```

PROCEDURE TIniModForm.LoadFromFile(FileName : String);
VAR
  S : String;
  T : TextFile;
  N, LastSec : Word;
BEGIN
  IniName := FileName;
  Caption := 'Editor - ' +
    ExtractFileName(FileName);
  AssignFile(T, FileName);
  Reset(T);
  N := 0; LastSec := 0;
  WHILE NOT Eof(T) DO
    BEGIN
      ReadLn(T, S);
      S := Trim(S);
      IF S <> '' THEN
        BEGIN
          N := N + 1; {Section? add at top level}
          IF (S[1] = '[') AND (S[length(S)] = ']') THEN
            BEGIN
              Outline1.Add(0, S);
              LastSec := N;
            END
          ELSE
            BEGIN
              {Add below last section. If no last section
              create a blank section head}
              IF LastSec = 0 THEN
                BEGIN
                  Outline1.Add(0, '[(none)]');
                  LastSec := N;
                  N := N + 1;
                END
            END
        END
      END;
      Outline1.AddChild(LastSec, S);
    END;
  END;
  CloseFile(T);
  Enabled := True;
end;

procedure TIniModForm.Outline1MouseDown(Sender: TObject;
  Button: TMouseButton; Shift: TShiftState; X, Y: Integer);
begin
  Outline1.BeginDrag(False);
end;

procedure TIniModForm.Outline1DragOver(Sender, Source: TObject; X,
  Y: Integer; State: TDragState; var Accept: Boolean);
begin
  WITH Outline1 DO
    IF (Source = Outline1) AND (Y >= 0) THEN
      Accept := (GetItem(X,Y) <> SelectedItem) AND
        (Items[GetItem(X,Y)].Parent = Items[SelectedItem].Parent)
      ELSE Accept := False;
    end;
end;

procedure TIniModForm.Outline1DragDrop(Sender, Source: TObject; X,
  Y: Integer);
begin
  WITH Outline1 DO
    Items[SelectedItem].MoveTo(GetItem(X,Y), oaInsert);
    IniChanged := True;
  end;
end;

```



Figure 6: The LoadFromFile method loads an .INI file into the .INI editor; the three other methods make it possible to drag sections and keys.

vateProfileString and its cousins nor the Delphi TIniFile object are suitable for reading an entire .INI file. Neither provides a method for listing all the sections in a file, and neither can handle multiple identical keys such as the device= lines in SYSTEM.INI.

So instead, COA simply reads each nonblank line of the .INI file one at a time. If the line is a section heading, COA adds it to the outline at the top level; otherwise, COA adds it beneath the current section. If comments or other lines occur before the first section, COA inserts a phony section titled "[none]" to preserve the outline structure. Figure 6 shows the method that loads an .INI file into the editor, along with the three methods that enable drag-and-drop editing.

The .INI file editor lets the user move whole sections or keys within a section by dragging with the mouse. You can enable dragging for any Delphi component by setting its DragMode property to dmAutomatic. However, this makes it impossible to use the mouse with that component for anything except dragging.

COA gets around this problem by calling BeginDrag(False) in the outline's OnMouseMove event handler. Passing the False parameter to BeginDrag causes the component to enter dragging mode only after the mouse moves a short distance. Thus the outline is able to support drag-and-drop yet still respond to clicks and

double-clicks as it should.

In order to talk about drag-and-drop, it helps to have a few shorthand terms. We'll call the dragged component the *draggee* and the components over which it gets dragged the *targets*. When you drag a component, the mouse cursor changes to an arrow-plus-rectangle symbol or to a slashed-circle "no" symbol, depending on whether the current target can accept a drop from the draggee. The target receives an OnDragOver event and sets the

Accept parameter to indicate whether or not it can accept a drop.

In this case, the draggee and the target should be the same, as we're trying to drag lines around in the outline. Thus the OnDragOver event handler starts by checking whether the Source parameter (the draggee) is the same as Outline1. If not, it sets Accept to False. To get around a quirk in Delphi, this method also checks to make sure the Y value for the mouse cursor's location is nonnegative.

```

procedure TFileListForm.CreateParams(var Params: TCreateParams);
BEGIN
  Inherited CreateParams(Params);
  WITH TIniFile.Create(ChangeFileExt(
    ExtractFileName(Application.ExeName), '.INI')) DO
    try
      Params.X := ReadInteger('FileList', 'Left', 0);
      Params.Y := ReadInteger('FileList', 'Top', 0);
      Params.Width := ReadInteger('FileList', 'Width', 189);
      Params.Height := ReadInteger('FileList', 'Height', 162);
    finally
      Free;
    END;
  END;
END;

procedure TFileListForm.FormDestroy(Sender: TObject);
begin
  WindowState := wsNormal;
  WITH TIniFile.Create(ChangeFileExt(
    ExtractFileName(Application.ExeName), '.INI')) DO
    try
      WriteInteger('FileList', 'Left', Left);
      WriteInteger('FileList', 'Top', Top);
      WriteInteger('FileList', 'Width', Width);
      WriteInteger('FileList', 'Height', Height);
    finally
      Free;
    END;
  end;
end;

```



Figure 7: Delphi's TIniFile object includes methods to read and write String, Integer, and Boolean values. COA uses this object to read and write to its own .INI file.

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If the OnDragOver event is indeed being caused by dragging a line from the outline itself, the event handler calls the outline's GetItem method to get the index of the item under the mouse cursor. It sets Accept to True only if this item has the same parent as the selected item in the outline but is not equal to the selected item. All keys in a section have the same parent, so this permits dragging of keys

within a section only. All sections have the same parent, because they're at the top level, so this method also permits dragging one section onto another.

When the user releases the mouse button, an OnDragDrop event goes to the target component, but only if the target has already indicated that it will accept this event. Thus the OnDragDrop event handler can safely assume that the

draggee is Outline1 and that the item on which the drop event occurred has the same parent as the selected item. All it needs to do is call the MoveTo method of the selected item to move it to a position just before the dropped-on item. That's it! These three small methods enable drag-and-drop editing for moving keys within sections and moving sections within the file.

GUIDE TO OUR UTILITIES & HOW TO GET THEM

COA

PURPOSE: COA lets you send change-of-address notices to Windows when you change the location of a Windows program on your system. It can be used to update your .INI files, .GRP files, and registration database automatically, or you can use the built-in .INI and .GRP file editors to make changes manually.

USAGE: To install COA, simply copy the program files COA.EXE and COA.HLP to a directory on your hard disk, and then use Program Manager to add an icon for COA.

COA is flexible, but the simplest way to change the address of a program is to start with the Find and Replace window. Type the old address on the Find What line and type the new address on the Replace With line. Go to the File List window and press the Plus speed button to select which .INI and .GRP files to modify. Then press the DO IT button in the Find and Replace window. COA will automatically update your registration database and the .INI and .GRP files you have selected.

COA also contains viewers to help in selecting .GRP and .INI files for processing, and editors for making manual changes to .GRP and .INI files. You can obtain on-line help at any time by pressing the F1 key.

FILES FOR COA.EXE—the executable program only
DOWNLOAD: COA.DOC—the documentation file only
 COA.ZIP—the source code, program, and documentation files

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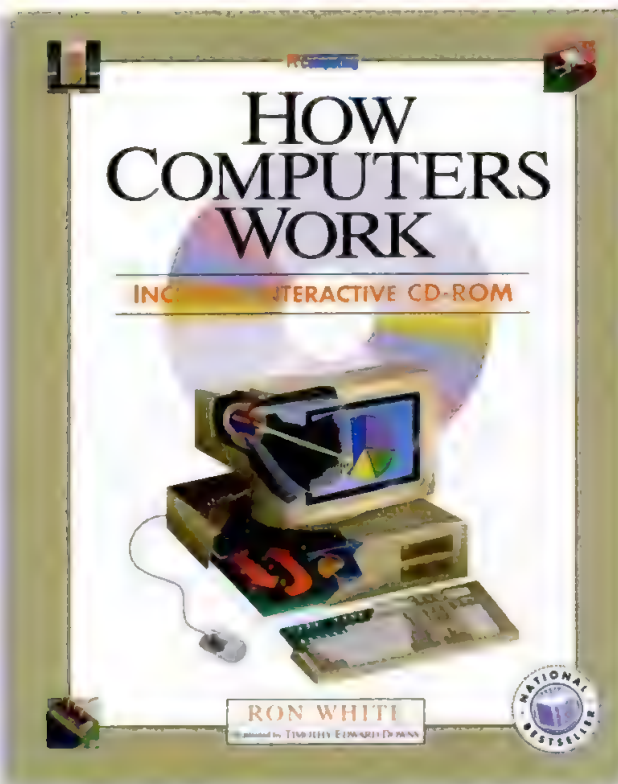


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COA'S OWN .INI FILE When loading .INI files into the .INI viewer or editor, COA has to allow for peculiarities like comment lines and duplicate keys. However, for reading and writing its own .INI file, COA uses Delphi's TIniFile object. COA.INI stores the status of the four Options menu choices, along with the size and position of the main window and the three child windows. Figure 7 shows the code used by the file list window to read its position and location from the .INI file.

The Windows .INI file functions such as GetPrivateProfileString require their parameters to be ASCII strings (PChars in Delphi parlance). Delphi uses Pascal-style strings internally, and the TIniFile object's methods expect Pascal-style strings for the section and key names, and for string-type values.

Note the try..finally..end block in both methods. The code after finally is a protected block; Delphi's exception handling guarantees that it will get executed even if an exception occurs during the try block. Each method creates a TIniFile object with the same name as the executable program with the extension .INI. The try..finally..end structure ensures that the memory allocated to this object will be freed.

For those familiar with exception handling in other environments, yes, Delphi does include the ability to handle specific exceptions or classes of exceptions, and to raise exceptions. You'll find examples of exception handling in the GROUP .EXC.PAS unit, which defines a specialized exception type for errors in reading .GRP files, and in the GROUPFIL.PAS and GROUPITE.PAS units, which implement the reading and writing of .GRP files.

COA could have performed its function perfectly well without all of its various viewers and editors. However, adding the viewers and editors wasn't terribly difficult, and they make COA useful even when you're not in the process of shuffling directories around on your hard disk. And when you do need to send Windows a change-of-address notice, there's nothing like COA! □

NEIL J. RUBENKING IS TECHNICAL EDITOR OF
PC MAGAZINE.

PC Solutions

TIPS AND TECHNIQUES TO INCREASE YOUR PRODUCTIVITY

■ HARDWARE

Falling Electrons

❓ I recently used a paint program to rotate some photos from horizontal to vertical format so they would more closely fit my screen. I then recalled seeing an ad for a monitor you could rotate 90 degrees to get a vertical presentation. Thinking to be clever, I grabbed my 14-inch monitor and turned it on its side. The image looked great—except that it took on a distinctly purple hue, particularly toward what had become the bottom of the screen. I had no idea that electron beams could be disturbed by gravity over such a short distance. I'd thought about building a monitor stand that would allow rotation, but now I'm concerned that it might damage my monitor.

*Judson K. Chapin
via the Internet*

► **PC MAGAZINE:** Though electrons are affected by the force of gravity, that's not what was happening inside your screen. Your colorful discovery can be explained sufficiently by the influences of electromagnetic fields.

The most obvious factor is a magnetic field build-up. To prevent this, almost all monitors include a degaussing feature that will generally clear the problem each time the monitor is powered up. Some larger monitors also include a manual degaussing button so you can activate that feature without cycling the power. Large monitors are so sensitive to a change in magnetic fields that turning the monitor to face a different direction while it is on can create flaws in the image; the Earth's magnetic fields are the source of the problem.

In this case, however, I suspect that the problem is not a build-up of magnetic

fields, but simply a lack of shielding in the monitor's housing. The bottom of the case is probably better shielded than the sides, because designers know it is likely to sit atop the computer, which can be a significant source of electromagnetic interference. When you placed the monitor on its side, this interference was able to affect the path of electron beams more significantly, resulting in the image discoloration. Setting the monitor back upright eliminated the interference, and the picture returned to normal.

Even if you are not planning to rotate your monitor, there is an important lesson to learn from this experience. More and more people are hooking up two monitors to their computers. Many CAD users, for example, have a text screen for commands and a graphics screen for displaying the drawing. Not all monitors are designed to be used in this way, however. Many have very little shielding on their sides, and when you place two monitors side by side, one or both images may be discolored or distorted. This won't harm the monitor, but it can be intolerably annoying. Some monitors are designed with extra shielding on the sides and so can be placed next to another similarly protected monitor with no ill effects for either image. If you are considering this type of configuration, be sure to find out what side

shielding the monitors have before you buy, since it's impractical to install monitor shielding on your own.—*Alfred Poor*

Unresolved Resolution

❓ I'm really starting to get annoyed with the need for frequent changes to my Windows-display-driver setting. I used to be able to use 800-by-600 at 32,000 colors for everything, but now I have a number of new programs that crash unless they run at 256 colors; some even require that I drop down to 640-by-480 resolution.

My graphics adapter uses a Western Digital chip. The computer manufacturer informed me that it doesn't have an updated driver and that I should get a new graphics card instead. Do you have any suggestions?

*Edward D. Geist
Dallas, Texas*

► **PC MAGAZINE:** Depending on the value you place on the time you spend reconfiguring your system, a newer graphics card could be an inexpensive solution that could also yield significant performance gains, especially since you prefer to run Windows at 32,000 colors (15-bit color depth). If you don't want to spend money on a new card, though, you still can look for a more recent Windows driver; it is

PC SOLUTIONS INDEX

Hardware

Falling Electrons.....283
Unresolved Resolution...283

Operating Environments

*Taking Control of
Control Panel*.....284
*Breaking Out of Nested
Batch Files*.....292

Word Processing

*Mailmerge Problem with
Word 6.0*.....300

Spreadsheets

*Splitting Up Large Files
for Import*.....300

Databases

*Two Useful Add-On
Wizards for Access 2.0*...308



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See index, page 292.

possible that a new driver will solve your problem.

You'll need to know which Western Digital chip you have on your graphics card. The number on the large, rectangular chip will begin with the letters WDC. You can then find the most recent driver in the Microsoft Windows Driver Library. You can access this library through a number of on-line services including CompuServe and Genie, or through the Microsoft Download Service at 206-936-6735 (in Canada, 905-507-3022). You can also call Customer Sales at 800-426-9400 to request a disk with the latest driver for your card. There's a good chance you'll be able to find a newer driver for your graphics adapter, and that this will solve your display problems.—*Alfred Poor*

OPERATING ENVIRONMENTS

Taking Control of Control Panel

When I started using Windows, I tried to rearrange the icons in Control Panel, but I soon gave up. I assumed that the number and order of the icons were invi-

olably locked up in CONTROL.EXE or some other file no one had access to. Then I got Parsons Technology's Address Book for Windows, and in a few seconds, its installation program placed a new icon called Telephony into my Control Panel.

How was this done? Is there any way I could do something similar, at least to change the order of the icons? I'd like to put Desktop, which I access on a daily basis, into the first position.

I hope you can help. I've spent hours looking at every file in the \Windows and \Windows\System directories looking for

something that was modified by Address Book, with no luck.

*Joseph Zmuda
San Francisco, California*

► **PC MAGAZINE:** Control Panel loads its applets in a particular order, and the position of the icons in the Control Panel window reflects that order. It starts by loading default applets such as Color, Desktop, and Printers. Next it looks in the [MMCPL] section of CONTROL.INI and loads any applets defined there. Finally, it looks for files in the \Windows and \Windows\System directories that have the extension .CPL and checks them to be sure they're valid Control Panel files. After loading a valid .CPL file, Control Panel sends it a series of messages that load the icons for the applets it contains. Since you didn't detect any changes in CONTROL.INI, your Address Book program must have installed a new .CPL file.

It is complicated, and you don't have much control over the process, but there are a few things you can do. First, if there are any default applets you rarely use, you can suppress them by adding a line to the [Don't Load] section of CONTROL.INI. The line should start with the applet's name, followed by an equal sign and any text at all. For example:

```
[Don't Load]
Keyboard=nyet
Ports=no way
Date/Time=who needs it
International=uh-uh
```

If you suddenly find a need for one of the suppressed applets, simply delete the corresponding line from CONTROL.INI.

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For any tip we print, you'll receive \$50 plus a *PC Magazine* T-shirt. We regret that we cannot answer letters individually.

Mr. Boddy has been murdered, and his killer remains at large. But ~~unfortunately~~ today before the scheduled 8:00 ~~pm~~ reading of Mr. Boddy's last will and testament, the ~~murderer~~ will change the document to suit in his or her favor.

Unfortunately Boddy's close ~~to~~ living ~~relative~~, Mr. Green, is ~~about~~ away on business and was not informed of his cousin's death. But those who have gathered at the Boddy mansion for the reading include Mrs. Peacock, the ~~accusatory~~ ~~stern~~ sister-in-law; Colonel Mustard, a ~~well~~ known ~~murderer~~ ~~professor~~ ~~Ph.D.~~ ~~and~~ ~~classmate~~ during his days at Yale; Mrs. Scarlet, a "special friend"; and Mrs. White, his loyal servant of 25 years.

Please help us find the killer by determining who changed the will... where... and with what...

MIDWEST MICRO



The Sound Book II With Convenience Is Served



Personality Modules...



...and the SoundBook II. The SoundBook II is the only notebook that can be configured to meet your needs. And that's what makes it the only notebook that should feel right at home!

When the main course is murder, people tend to lose their appetite—but they still hunger for convenience. And that's where the **NEW SoundBook II** comes in. Featuring a programmable Personal TouchPad, two RAM compartments and a modular design, this MidWest Micro Notebook is dressed to kill. So before we interrogate the other suspects at the table, let's investigate the SoundBook II...

Powerful Features...Weak Alibi

Who *knows* where this portable was on the night in question? Weighing only 5 lbs., it could have gone anywhere. It even has a built-in floppy drive. The SoundBook II with a built-in floppy drive at 6:37 p.m. While another source swears the same drive bay was carrying an AC adapter at precisely 6:40! What makes the SoundBook II such a master of disguise?—It uses special compact peripherals, A.K.A. Personality Modules, that fit its modular 3.5" drive bay. Enjoy the floppy drive and AC adapter modules that come with your SoundBook II. And feel free to order additional modules like a 3.5" CD-ROM drive, a 14.4 Kbps voicemail fax modem, an extra hard drive and an extra battery.

Evidence Stacked In Your Favor

If *speed* is your motive, you may want to check out MidWest Micro's Pentium™ Processor Based SoundBook Plus. Like the SoundBook II, it comes with 16-bit stereo audio and built-in speakers. But this SoundBook *also* features a 75 MHz or 90 MHz Intel® Pentium Processor. And if you think *that* sounds like a setup, get a load of The Real Warranty. It covers all MidWest Micro Notebooks for a full three year sentence—parts *and* hard labor included! We can only assume that Mr. Boddy (being of sound mind) would have loved both MidWest Micro SoundBooks.

Contributing To The Delinquency Of A Diner?

Although it's unlikely that these MidWest Micro Notebooks are capable of murder, they *may* be found guilty of aiding and abetting. In fact, one of these guests may have already used a SoundBook to change Mr. Boddy's will... Perhaps Mrs. Peacock is doing it *right now!*—Or maybe she's just playing a little Microsoft® Golf.

After all, it's not just the SoundBook II that's a powerful device. It's the fact that another day this powerful device was here *been committed.*



"Fastest portable we've ever tested, a fine desktop replacement"
— PC World, April 1995
"MidWest Micro wowed us with its Elite Pentium SoundBook Plus, the first Pentium-90 notebook we've tested; its performance blows every other reviewed mobile out of the water."
— PC World, March 1995
"...produced the highest Windstone 95 score of all reviewed systems"
— PC Magazine, January 1995

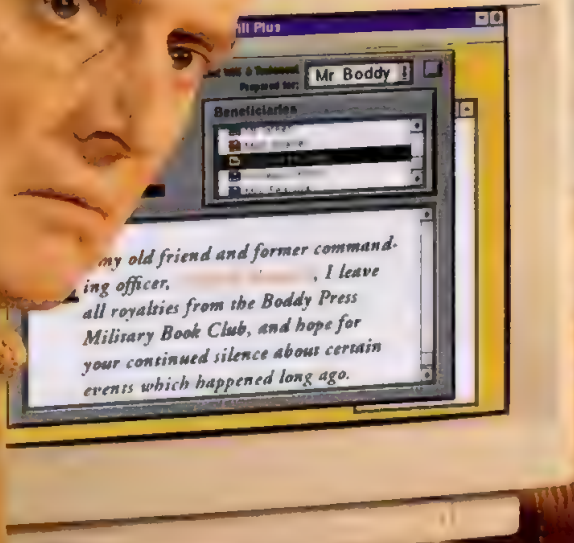


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Colonel Mustard



In The Kitchen With A Midwest Micro PC?

"It's darn fast and darn cheap."
— PC Computing, April 1995
"The Elite P5-90 is one of the fastest computers we've tested."
— PC World, January 1995



*"I can't believe these people didn't put lunch on the itinerary," the Colonel grumbled. "And you would **think** a person with this much money could afford better lunch meat." Was it merely hunger pains that brought Colonel Mustard into the kitchen this afternoon? Or was it Mr. Boddy's Midwest Micro Home PC... and revenge!...*

Mustard hadn't touched a computer since his code cracking days in the Middle East. But this "MidWest Micro Home PC" looked nothing like *that* relic. Typing in the secret password with his one good hand, the Colonel checked his watch again. He knew exactly how long it would take the IntelDX4™ 100 Processor to find the will, make the changes and save them on the Home PC's 850 Mb hard drive. "Not bloody long at all," he said with a smirk.

Colonel Mustard had planned his strategy very carefully. And after reading six computer magazines cover-to-cover, he learned that MidWest Micro Desktop Systems are available with Intel 486™ and Pentium™ Processors, double- and quad-speed CD-ROM drives, voicemail fax modems and hard drive capacities up to 1.6 Gb! And whether you order a multimedia-packed Home PC or an Office PC stocked with powerful business software, you should always expect an ambush of high performance. But even nine weeks at boot camp, two wars and a Purple Heart didn't prepare the Colonel for what he was about to witness...

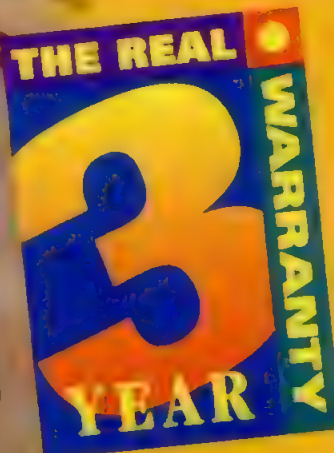
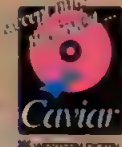
Opening the Home PC's Microsoft® Family Bundle, Mustard found an arsenal of interactive CD-ROM software—Encarta™ 95, Works, Money, Scenes, Dangerous Creatures and Golf were his to conquer. Before he knew it, the 15" color screen had exploded into multimedia mutiny. And he was even *more* impressed with Microsoft Bob™. Featuring eight household management programs in one efficient package, this new recruit had all the makings of a great soldier.

By this time the Colonel was distracted from his original covert operation. So he set a course for the library to see what Mr. Boddy's 120 MHz Office PC had to offer...

Who killed Mr. Boddy and changed his will? The rest of the investigation is up to you...

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▶ The Real 3 Year Warranty							



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▶ PCI Fast IDE Interface		▶ PCI Fast IDE Interface		▶ PCI Fast IDE Interface		▶ PCI Fast IDE Interface	
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- ▶ Microsoft® Works for Windows 3.0 & Golf
- ▶ Lotus Organizer 2.0
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The next time you start Control Panel, that applet will appear.

Better yet, if you use Desktop daily, give it a Program Manager icon all its own. Choose New from ProgMan's File menu, click OK to create a new program item, and enter Desktop as the description. For the command line, use

```
CONTROL main.cpl DESKTOP
```

Click the Change Icon button, then press Browse and select the file MAIN.CPL. You'll see all the icons for the default applets displayed. Choose the Desktop icon, click OK a few times, and you're done. You now have an icon that takes you directly to the Desktop applet without even opening Control Panel.

—Neil J. Rubenking

Breaking Out of Nested Batch Files

❓How do you force termination of batch-file processing? Say you have a

```
@ECHO OFF
ECHO Example of batch file self-termination

:Loop
ECHO Error encountered; all batch processing must terminate.
REM ^C in next line is the Ctrl+C character
ECHO ^C ! PAUSE > NUL
ECHO You must answer Y!
GOTO Loop
```

Figure 1: This batch file demonstrates a method for terminating all batch processing by redirecting a Ctrl-C character to the PAUSE command.

batch file A.BAT that CALLs B.BAT. B.BAT then encounters a critical situation where it must stop all further execution of itself and A.BAT. How would it do so? Is there any clever mechanism of automating this? An all-batch solution would be best, of course.

Atif Aziz Chaudhry
Geneva, Switzerland

►**PC MAGAZINE:** One sure way to halt all batch processing, no matter how deeply it's nested, is to press Ctrl-C or Ctrl-Break. It turns out that redirecting a Ctrl-C character into any of several DOS commands has the same effect as pressing Ctrl-C. The batch file halts, and DOS asks

the user "Terminate batch job (Y/N)?" To insert a Ctrl-C character into a file using DOS's EDIT utility, press Ctrl-P and then Ctrl-C.

Unfortunately, there's no easy way to force a Y answer to the "Terminate. . ." question, and relying on the batch file's user to answer Y is a little nerve-wracking. Figure 1 shows a possible solution. The batch file redirects a Ctrl-C character to the PAUSE command, which has the same effect as pressing Ctrl-C. Then if the user fails to answer Y to the "Terminate . . ." question, the batch file just loops and does it again, repeating until Y is pressed.

One warning: This technique is specific to batch-file nesting with the CALL

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CompuServe309	
COMPUTER DISCOUNT	
WAREHOUSE295	
First Source International315	
H. Co Memory Upgrades331	
INSIGHT DIRECT, INC.328	
LA Trade320	
Megahaus294	
Micro Solutions314	
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292 PC MAGAZINE JUNE 13, 1995

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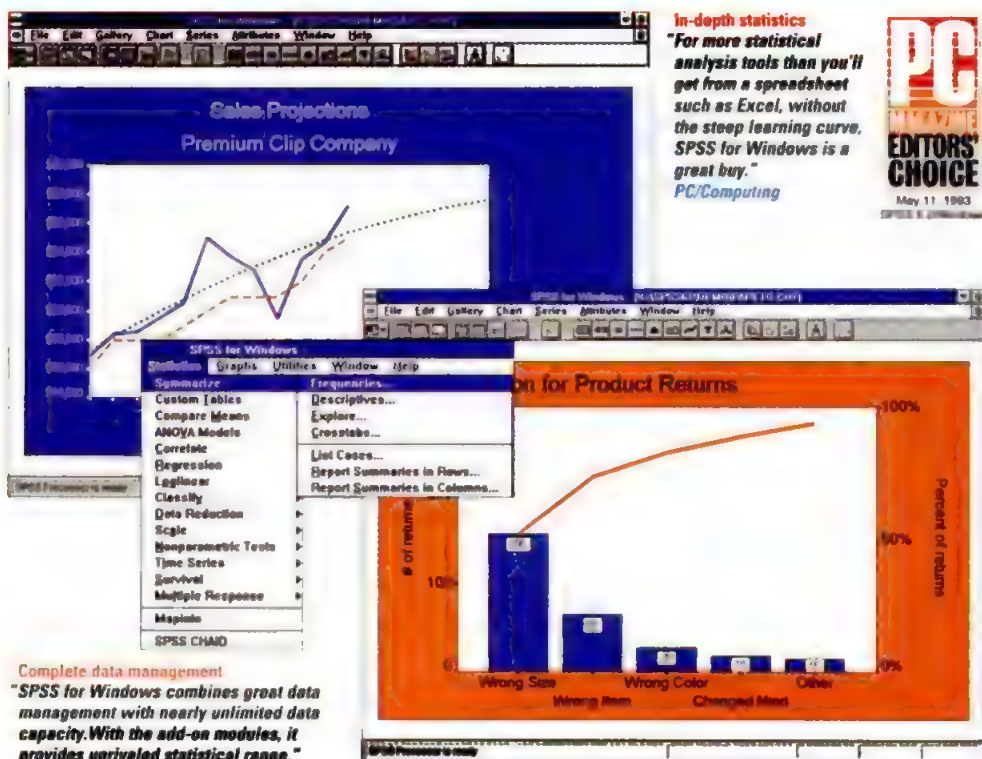
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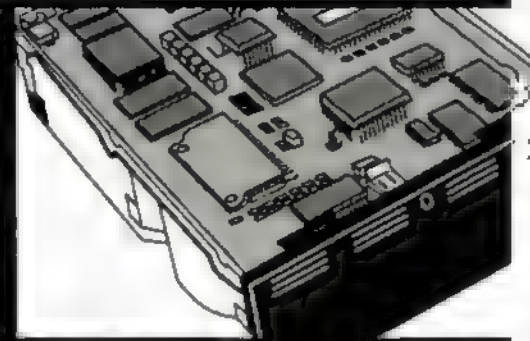
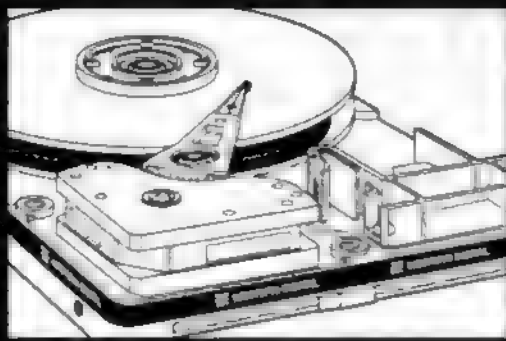
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850MB	10ms	CNR850A	\$247
1275MB	9ms	CNR1275A	\$368
SCSI			
1080MB	11ms	CFP1080S	\$469
2147MB	8.5ms	CFP2105S	\$879
2147MB	8.5ms	CFP2107S	\$985

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2050MB	8.5ms	MC4221	\$939
4294MB	8ms	MC3243	\$1325
9100MB	12ms	MC1991	\$2129
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2050MB	8.5ms	MC4221W	\$1079
4294MB	8ms	MC3243W	\$1499
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2000MB	8.5ms	MC4221AV	\$1039
4294MB	8ms	MC3243AV	\$1459
9100MB	12ms	MC1991AV	\$2329

Call for MicroDisk externals and AV WIDE

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545MB	14ms	ST3660A	\$190
722MB	12ms	ST3780A	\$239
850MB	12ms	ST3850A	\$240
1083MB	12ms	ST31220A	\$350
SCSI (WIDE SCSI also available)			
1052MB	9ms	ST31230N	\$495
2147MB	9ms	ST32430N	\$872
2147MB	8ms	ST32550N	\$949
4290MB	9ms	ST15230N	\$1285
4290MB	8ms	ST15150N	\$1489
9080MB	11ms	ST410800N	\$2999

WESTERN DIGITAL

IDE			
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853MB	10ms	AC2850	\$265
1083MB	10ms	AC31000	\$357
1280MB	10ms	AC31200	\$382

HARD DRIVES

Quantum

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420MB	13ms	TB420A	\$183
540MB	14ms	MV540A	\$209
541MB	11ms	LTS40A	\$219
731MB	11ms	LT730A	\$249
SCSI			
540MB	14ms	MV540S	\$228
540MB	11ms	LT540S	\$240
731MB	11ms	LT730S	\$259
1080MB	9ms	IMP1080S	\$539
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IDE	Drive	PC Kit	Portable
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Qty 2-4 / 5-9 / 10+ or with drive	44MB	\$53/\$51/\$50	
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Toshiba	XM3501	4X	155ms	\$299
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Plextor	PX43CS	4X	170ms	\$339
Sanyo	SH254S	4X	190ms	\$239
Sony	CDU5SS	2X	250ms	\$159
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DRM624X	6Disc	4X	190ms	\$749
DRM1804X	18Disc	4X	300ms	\$1899
IDE (ATAPI)				
Toshiba	XM5302A	4X	190ms	\$199
Mitsumi	CRMCFX400	4X	230ms	\$185
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SCSI

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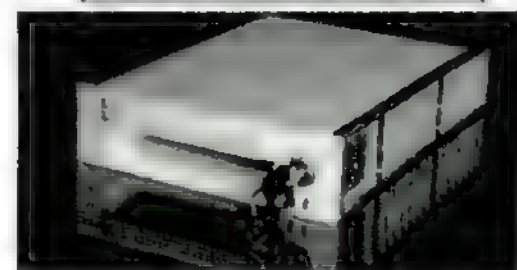
A1522BASIC 16Bit	\$129	\$109
A1542COREL 16Bit	\$235	\$225
A2742 EISA	\$379	\$369
A2842 VESA	\$259	\$249
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DC800B 16Bit Caching	\$199	\$189
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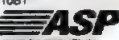
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SoundBlaster 16 ASP MCD	178.95
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Hercules Dynamite Pro ISA 1MB	147.84
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Hercules Dynamite Power VLB 1MB	144.77
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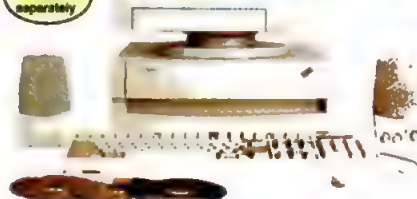
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statement. You can't use it to halt all processing of nested batch files if you nest them using the old COMMAND /C method.—Neil J. Rubenking

■ WORD PROCESSING

Mailmerge Problem with Word 6.0

❓ After switching from Microsoft Word 2.0 to Word 6.0, I've run into a problem creating merge documents. With Word 2.0, it's easy to insert fields from my Microsoft Access files into the main document regardless of the number of fields in the data file. You attach a data file to the main document by choosing File | Print | Merge and then the Attach Data File button. To insert a field at the cursor position, you choose the Insert Merge Field button from the Mailmerge Toolbar. Word then opens a dialog box that contains a *scrollable* list of all the fields in the data file. You simply highlight the field name and choose OK.

Word 6.0 offers an *almost* similar feature. You attach the data file by choosing Tools | Mail Merge. The Get Data button then lets you specify the file. The Insert Merge Field button then gives you a drop-down list of data fields. To insert a field at the cursor position, you open the drop-down list, highlight the field name, and choose OK.

Unfortunately, however, the field list in Word 6.0 is *not scrollable*. This is no problem if there are only a few fields in the data file. But one of the Microsoft Access 1.1 tables I often need to merge from includes 143 fields. Word 2.0 handles the 143-field table without problems. Word 6.0 does not.

When I choose the Insert Merge Field button in Word 6.0, the list of 143 fields appears at the extreme left of the Word window, and almost all of the fields are off-screen if Word is maximized. More fields show if I set Word to less than full-screen and move it far to the right side of the display before choosing the Insert Merge Field button. But even then, I can't move the Word Window far enough to the right to let me see—and choose from—the first column of fields in the database file. This makes the Word 6.0 mail-merge feature useless to me, no

matter what else it offers. Is there any workaround that will let me insert from a large number of fields?

Dennis J. Varnau
APO AP 96325-4806

► **PC MAGAZINE:** Reader Varnau has indeed found a limitation in the Word 6.0 mail-merge feature (though my first reaction to a single database file with 143 fields per record was to wonder if it might not make sense to restructure the data into two or more smaller tables). Assuming there's good reason to keep the data in

Word's Insert Merge Field button, with its list of data fields to choose from, is a welcome convenience for inserting fields in a master mail-merge document.

its current format, however, you can still insert a merge field easily enough, even if you can't see the name of the data field on your screen.

Word's Insert Merge Field button, with its list of data fields to choose from, is a welcome convenience for inserting fields in a master mail-merge document. But it's not the only choice. In fact, you can use the same techniques as for any other field.

For readers new to Word's fields, the simplest approach is to choose Insert Field. If you then highlight Mail Merge in the Categories list box and Merge-Field in the Field Names list box, Word will enter MERGEFIELD in the Field Codes text box below the two list boxes. You can then move to the text box, type in the name of the data field to merge, and choose OK to insert the merge field into your main document.

The resulting field is essentially identical to the field that Word would insert if you chose the data field name from the Insert Merge Field list. There's only one

potential difference: If there's an *X* in the Preserve Formatting During Updates check box, Word will add its * Mergeformat switch to the field when you choose OK. This normally tells Word to maintain the current format when it updates a field, but for merge fields it has no effect under any conditions I could find, since Word maintains any applied formats for merge fields in any case.

If you prefer, you can insert a merge field by typing it directly. Place the cursor where you want the field, then type Ctrl-F9 to insert the curly bracket markers that Word uses to designate a field. (These brackets look like the curly brackets that you can type as characters, but they are not the same thing.) Then type MERGE-FIELD inside the brackets, followed by a space and the name of the data field you want to merge. End by moving the cursor past the field, or by updating the field first with F9, and then moving the cursor off the field. The result will be identical to the field Word would insert if you had chosen the data field name from the Insert Merge Field list.

The disadvantage to inserting fields with either of these techniques, of course, is that you must know the data field name before you can type it in. Either choice, however, provides a straightforward workaround Word 6.0's inability to scroll the field names—at least until Microsoft corrects this oversight in some future upgrade.—M. David Stone

■ SPREADSHEETS

Splitting up Large Files for Import

❓ I use Lotus 1-2-3 (both DOS and Windows versions) to evaluate large quantities of data generated from other programs. The ASCII data files from the other programs are three numbers separated by a space. I sometimes have files containing more than 100,000 data sets.

I have used 1-2-3's Parse command in a macro to read in the values from the ASCII file generated from the other programs. However, using Parse is relatively slow. When working with files that contain fewer than 8,192 sets of data (8,192 is the maximum number of rows in a 1-2-3 spreadsheet), I simply read them in using

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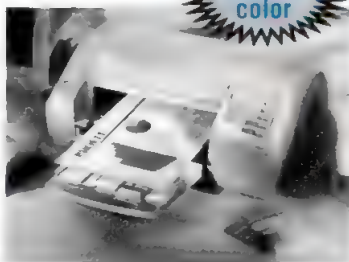
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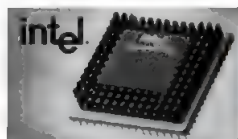


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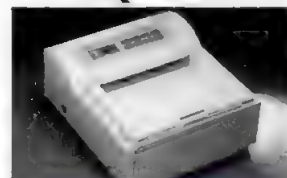
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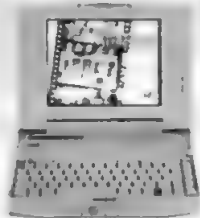
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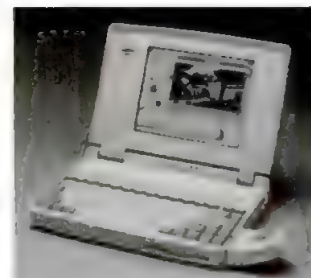
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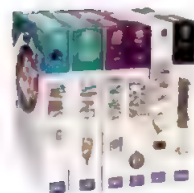
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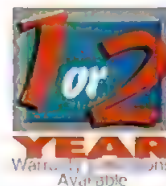
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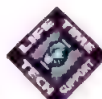
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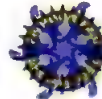
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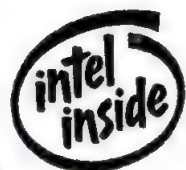


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Ports 1 Serial,
1 Parallel,
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/File Import Numbers, which is much faster than Parse. But my files frequently have more than 8,192 records.

Is there a way to take a large ASCII file and split it into a series of smaller files? I would like to take a file that contains 100,000 data sets and break it into 20 files containing 5,000 data sets each. I can then import the 20 files into 1-2-3 for evaluation.

*Clyde Borrell
Woodland Park, Colorado*

► **PC MAGAZINE:** The simplest solution I can think of would be to get yourself an industrial-strength text editor, one that imposes no file-size limitations other than those dictated by the amount of memory on your computer. The DOS Editor that comes with recent versions of DOS can handle very large files. Check to see if it can accommodate yours. If your files are too large for the DOS Editor, check out a shareware Windows product called MegaEdit. (WinNET Communications, P.O. Box 4189, Louisville, KY 40204; \$39.)

Once you have an editor that can read your file, you can create your smaller files by making selective deletions and using the Save As command.

—Craig Stinson

■ DATABASES

Two Useful Add-On Wizards for Access 2.0

► **PC MAGAZINE:** Microsoft Access 2.0 comes with a number of tools, called Wizards, that help you perform a function or task. For example, the Report Wizard asks you a series of questions and then generates a report design based on your answers. You can then modify the report or use it as is. Wizards are useful because they do much or all of the work for you. At the very least, they give you a starting point.

You can also purchase add-on wizards from third-party vendors to supplement those that come with Access. There are at least two tasks for which add-on wizardry is extremely well-suited: printing envelopes and generating mail-merge form letters. If you need some guidance in these areas, I rec-

ommend the Envelope Wizard and the Mail Merge Report Wizard, both from Cary Prague Books and Software.

With the Mail Merge Report Wizard you can quickly generate form letters. Unlike the Word for Windows Mail Merge Wizard that comes with Access, this one does not require Win-Word. Instead, it creates a customizable Access report design using the information in your Access table or query.

Creating the letter is easy. Just supply information for the return address and the recipient address, customize the salutation and date, compose the body of the letter, answer a few more questions, and press a few buttons. Voilà, out comes an Access report.

To provide the recipient address, you choose the names of the fields that will supply the merged information (like firstname, lastname, address, and so on), but you can also enter literal text if you like. You can also embed the names of fields in the body of the letter. For example, you might want to remind a customer about an outstanding balance. If the customer balance is in your table in the Balance field, you can include that in the body text. When Access runs the report, it replaces the field name with its contents.

The wizard offers to position the dates and other standard elements in appropriate places. The only obvious omission is

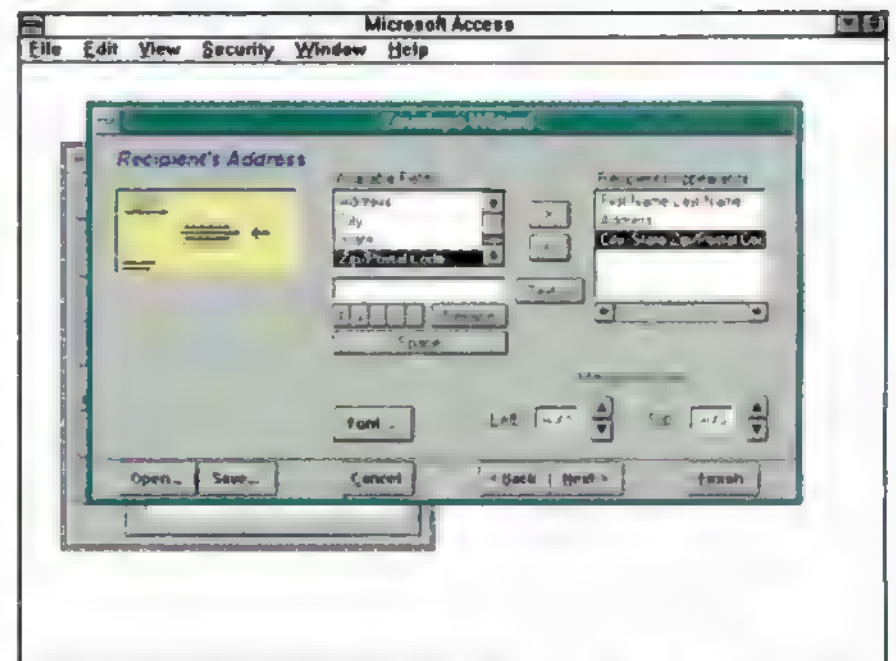


Figure 3: The Envelope Wizard walks you through the process of creating an Access report to print envelopes and includes support for printing USPS Postnet bar codes and FIM patterns.

support for conditional text, but you can modify the generated report to provide that if you wish. (Hint: Use an IIF function to include the text only if the condition is met.) You can also tell the wizard to place a logo or header at the top of your letter.

Like the Mail Merge Report Wizard, the Envelope Wizard asks a series of questions and then generates an Access report you can modify. It uses this report to print envelopes. The Envelope Wizard lets you place a message on the lower-left-hand corner of the envelope, such as "Important Financial Document." You can also print USPS Postnet bar codes or Facing Identification Mark (FIM) patterns. The package includes Postnet and FIM-pattern Truetype fonts and two booklets explaining their use.

Both wizards resemble their Microsoft Access-supplied cousins. If you've used Access's Mailing Label Wizard, for instance, you'll find that the Mail Merge Report and Envelope Wizards work similarly. But the latter lets you save your Wizard entries and call them back up.

As of this writing the Mail Merge Report and Envelope Wizards list for \$79.95 and \$69.95, respectively, or \$129.95 bundled together. For more information contact Cary Prague Books and Software, 800-277-3117 or 203-644-5891. □

—Sal Ricciardi

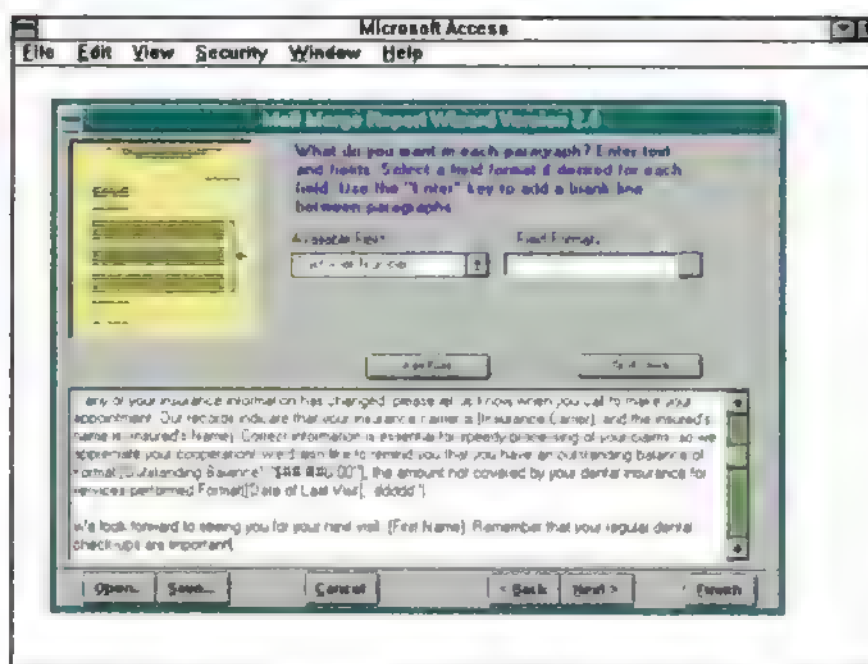
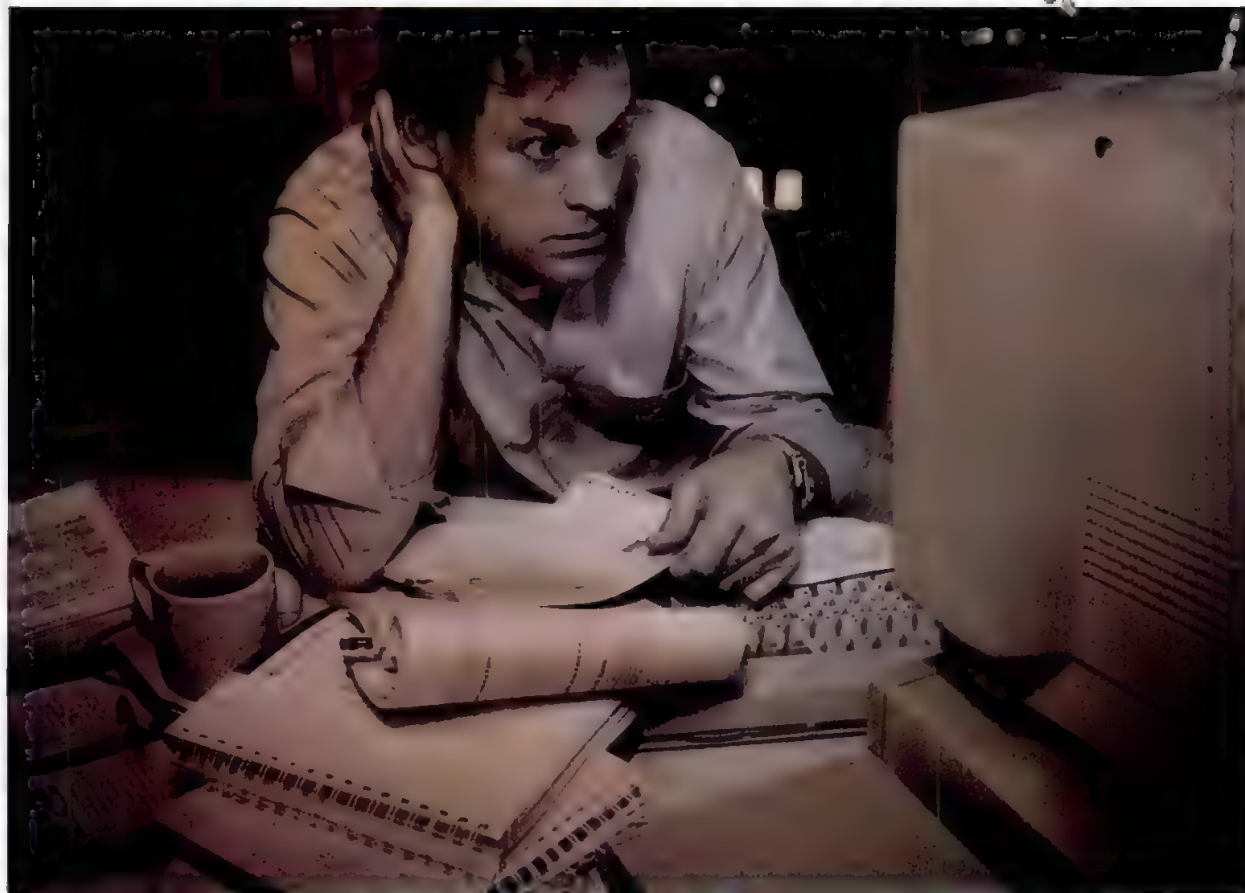


Figure 2: The Mail Merge Report Wizard lets you insert fields into the body of a form letter. When you do this, the contents of the specified fields will appear in the merged text of the resulting report.



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	32MB 310-3337.....\$1,220	

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Vectra VL2, XP, XU, M2, N2 and XM2 models	Netserver LM, LC and LF models	4MB D2974A.....\$179
	8MB D2975A.....\$356	16MB D2976A.....\$1,152
Vectra QS and RS models	4MB D1542 or 1642A.....\$177	Vectra 386/16N, 20N, 25N models
	2MB D2405A.....\$89	8MB D2404A.....\$305
Vectra 486 M, M1, N1 and X04 models	2MB D2381A.....\$95	8MB D2152A.....\$305
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Vectra 386/25, 486/25U, 33U, 33ST, 50U, 66U and 66ST	2MB D2381A.....\$95	8MB D2152A.....\$357
Vectra 386/33N, N1 models	2MB D2714A.....\$92	8MB D2715A.....\$304

IBM

Aptiva 300, 500 and 700 series	4MB n/a.....\$159	16MB n/a.....\$509
Edusight 55	4MB 7461299.....\$174	Edusight 30, 40 and 50 models
	4MB 60G0896.....\$174	16MB 60G0898.....\$549
PS/1 286, 386SX	2MB 92P9935.....\$83	4MB 92P9694.....\$163
Valuepoint Performance models	4MB 92G9201 or 73G3131.....\$179	8MB 92G7520 or 73G3132.....\$354
PS/1 Consultant, Essential, Expert models x43, x44	PS/Valuepoint all models except Cxx models	4MB 96F9290.....\$177
	16MB 96F9291.....\$609	PS/1 Consultant, Essential, Expert models
	16MB 96F9291.....\$609	PS/2 25/286, 30/286
	2MB 30F5360.....\$79	PS/2 35SX, LS, 40SX, 50Z, 55SX, LS, 70, XStation
	2MB 6450604.....\$87	PS/2 70-A21, A61, B21, B61, PS/Valuepoint Cxx models
	PS/1 Consultant, Essential, Expert models	2MB 6450608.....\$95
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NEC

Zenith		
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		SRM
	Z Note 425 Series	4MB 3.5"
		SRM 3.5"
	Z Sport 425, 425S	4MB
	Z Sport 425S	4MB
	MasterPort 500A, 510, 512	2MB
	MasterPort 500A	2MB
	MasterPort SL, 280, 310, 310S	2MB
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Cyrix 386-92	\$149.95
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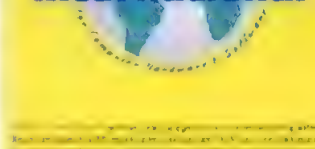
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1Mx8	4.00	4.50	5.00	5.50
2Mx8	7.25	7.75	8.25	8.75
4Mx8	12.00	12.50	13.00	13.50
8Mx8	20.00	21.00	22.00	23.00
16Mx8	32.00	34.00	36.00	38.00
32Mx8	48.00	51.00	54.00	57.00
64Mx8	64.00	68.00	72.00	76.00
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INTEL Math Chips

8007	8007-2	8007-2	8007-2
8007	4.00	4.50	5.00
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Amiga 500	8Mx16	50087-004	239.00
Amiga 500	16Mx16	50087-008	399.00
Amiga 500	32Mx16	50087-016	659.00
Amiga 500	64Mx16	50087-032	1119.00
Amiga 500	128Mx16	50087-064	2119.00
Amiga 500	256Mx16	50087-128	4119.00
Amiga 500	512Mx16	50087-256	8119.00
Amiga 500	1024Mx16	50087-512	16119.00

AMBA

Amiga 500	4Mx16	175.00/369.00/599.00
Amiga 500	8Mx16	189.00/389.00/619.00
Amiga 500	16Mx16	199.00/399.00/629.00
Amiga 500	32Mx16	209.00/409.00/639.00
Amiga 500	64Mx16	219.00/419.00/649.00
Amiga 500	128Mx16	229.00/429.00/659.00

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MODEL	AMT. UPGRADED	AST PART #	PRICE
Z8000	4Mx16	24300ME	59.00
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Processor	Screen	HD	Price
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486DX2/50	8.5" Dual Scan	260MB	2829
486DX4/75	8.5" Dual Scan	170MB	3099
486DX4/75	8.5" Dual Scan	260MB	3379

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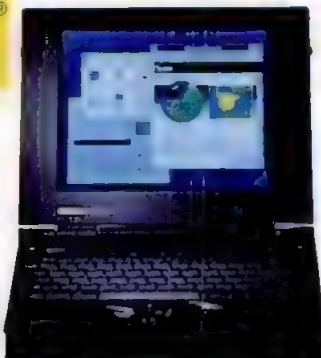


HP Scanners

HP ScanJet 3P (grayscale) \$479.99
HP ScanJet 3C (color) \$499.99

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Trakker 250MB (portable) \$269.99
Trakker 350MB (portable) 339.99
Trakker 700MB (portable) 399.99
Jumbo 250MB (internal) 139.99
Jumbo 350MB (internal) 169.99
Jumbo 700MB (internal) 269.99
Jumbo 1400, 1.36GB (internal) 369.99
T1000, 800MB (internal) 199.99



HP OmniBook 4000 Notebook PC

HP OmniBook 4000

- 10.4" Active & 10.3" Dual Scan
- Built-in 16-bit sound, microphone & speaker
- Replace floppy w/ 2nd battery for 5-7 hrs. battery life
- Built-in infrared for no hassle printer connections

Processor	Screen	HD	Price
486DX2/50	10.3" Dual Scan	260MB	\$2499
486DX2/50	10.3" Dual Scan	340MB	2829
486DX2/50	10.3" Dual Scan	520MB	3199
486DX2/50	10.4" Active	340MB	3769
486DX2/50	10.4" Active	520MB	4129
486DX4/100	10.3" Dual Scan	340MB	3619
486DX4/100	10.3" Dual Scan	520MB	3999
486DX4/100	10.4" Active	340MB	4489
486DX4/100	10.4" Active	520MB	4829

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HP LaserJet 4L printer (IBM, 300dpi) \$499.99
HP LaserJet 4ML printer (IBM&MAC, 300dpi) 1019.99

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HP DeskJet 320 printer w/feeder 359.99
HP DeskWriter 320 printer (portable) 299.99
HP DeskWriter 320 printer w/feeder 359.99
HP DeskJet 540 printer 289.99
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HP DeskJet 560C printer 479.99
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Versa M

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- True colors displays available-16.7 million colors on notebook
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- Replace floppy w/ 2nd battery for 6-10 hrs. battery life
- Replace floppy w/ Versa Bay - Add extra PCMCIA
- Built-in 16-bit sound, microphone & speaker
- Upgradable hard drive - easily add more storage

Processor	Screen	HD	Price
486DX4/75	9.5" Dual Scan	250MB	\$3049
486DX4/75	9.5" Dual Scan	340MB	3119
486DX4/75	9.5" Active	340MB	3739
486DX4/75	9.5" Active	540MB	3999
486DX4/75	9.5" True Color	340MB	3999
486DX4/75	9.5" High Res.	540MB	4399
486DX4/100	9.5" Active	340MB	4069
486DX4/100	9.5" True Color	540MB	4629
486DX4/100	9.5" Active	810MB	4729
486DX4/100	9.5" High Res.	540MB	4729
486DX4/100	9.5" High Res.	810MB	5099



Versa P

Versa P

- 5MHz Pentium - for blazing performance
- High Res. displays available - 800x600 res. on notebook (10.4" on selected models)
- Removable Reversible display
- Replace floppy w/ 2nd battery for 6-10 hrs. battery life
- Replace floppy w/ Versa Bay - Add extra PCMCIA
- Built-in 16-bit sound, microphone & speaker
- Upgradable hard drive - easily add more storage

Processor	Screen	HD	Price
Pentium 75	9.5" Active	340MB	\$4349
Pentium 75	9.5" Active	540MB	4629
Pentium 75	9.5" Active	810MB	4999
Pentium 75	9.5" High Res.	540MB	4999
Pentium 75	9.5" High Res.	810MB	5389
Pentium 75	10.4" Active	540MB	4999
Pentium 75	10.4" Active	810MB	5389
Pentium 75	10.4" High Res.	810MB	5769

Versa V

- Replace floppy w/ 2nd battery for 6-10 hrs. battery life
- Upgradable hard drive - easily add more storage
- 32-bit local bus with 1MB video RAM
- 64K colors on notebook display (Active only)

Processor	Screen	HD	Price
486DX2/50	9.5" Dual Scan	250MB	\$2369
486DX2/50	9.5" Dual Scan	340MB	2499
486DX2/50	9.5" Active	250MB	2889
486DX2/50	9.5" Active	340MB	3029
486DX2/50	9.5" Active	540MB	3399
486DX4/75	9.5" Active	340MB	3249
486DX4/75	9.5" Active	540MB	3779

Ready Multimedia

- Quad speed CD-ROM drive
- 16-bit SoundBlaster compatible sound card
- PCI local bus - high-speed graphics
- 14.4 fax/modem, speaker phone, answering machine
- LOADS of FREE software

Chassis	Processor	HD	Price
Minitower	486DX4/100	540MB	\$1699
Minitower	Pentium 75	850MB	1999
Minitower	Pentium 90	850MB	2299
Minitower	Pentium 90	1.2GB	2699
Minitower	Pentium 100	1.2GB	2999

Monitors priced separately.

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Contura 410

Contura 410

- Upgradable hard drive - easily add more storage
- 32-bit local bus with 1MB video RAM
- Extended life NiMH battery technology
- Compaq, 3-year worldwide warranty

Processor	Screen	HD	Price
486DX2/50	9.5" Dual Scan	350MB	\$2369
486DX2/50	8.4" Active	350MB	2839



LTE Elite

LTE Elite

- 10.4" Active Matrix display
- Fast 486DX4/75 processor
- Built-in AC adapter - small, sleek design & reduced weight
- Upgradable hard drive - easily add more storage

Processor	Screen	HD	Price
486DX4/75	9.5" Dual Scan	340MB	\$3129
486DX4/75	9.5" Dual Scan	510MB	3499
486DX4/75	10.4" Active	510MB	5029
486DX4/75	10.4" Active	810MB	5389

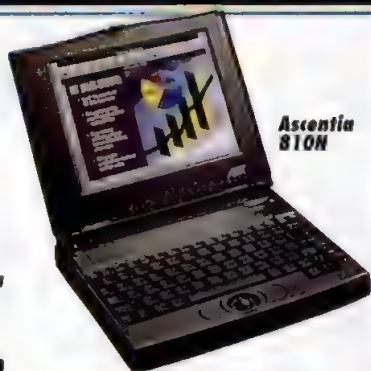


Ascentia 910N

Ascentia 910N

- 10.4" Active & 10.3" Dual Scan
- Lithium Ion battery technology
- Intelligent power management to maximize performance
- Integrated Smartpoint - small, accurate & easy to use

Processor	Screen	HD	Price
486DX2/50	10.3" Dual Scan	340MB	\$2559
486DX4/75	10.3" Dual Scan	510MB	2749
486DX4/75	10.4" Active	510MB	3829
486DX4/75	10.4" Active	700MB	4129



Ascentia 810N

Ascentia 810N

- 486DX2/66 processor - to speed through your applications
- 10.4" Dual Scan display
- Replace floppy w/ 2nd battery for 4-6 hrs. battery life

Processor	Screen	HD	Price
486DX2/66	10.4" Dual Scan	250MB	\$1969
486DX2/66	10.4" Dual Scan	340MB	2109
486DX2/66	10.4" Dual Scan	510MB	2259

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Force Desktop

Force Minitower

Chassis	Processor	HD	Price
Minitower	Pentium75	1.28GB	\$2299
Minitower	Pentium100	1.28GB	2759

Monitors priced separately.

Force Desktop

Chassis	Processor	HD	Price
Desktop	Pentium75	1.28GB	\$1929
Desktop	Pentium100	1.28GB	2419

Monitors priced separately.

- Quad Speed CD-ROM drive
- 16-bit SoundBlaster compatible sound card
- PCI local bus, high-speed graphics
- PCI local bus hard drive
- 14.4 fax/modem, speaker phone and answering machine
- LOADS of FREE software

IBM



ThinkPad 755CD

ThinkPad 755CE, CSE & CD

- Built-in CD-ROM Drive (755CD models only)
- Built-in 16-bit sound, microphone, speaker (MIDI on 755 CD models)
- 10.4" Active (65K colors) & 10.4" Dual Scan
- 14.4 fax/modem, speaker phone, answering machine & voice mail
- Built-in infrared

Processor	Screen	HD	Price
486DX4/100	10.4" Dual Scan	340MB	\$4099
486DX4/100	10.4" Dual Scan	540MB	4449
486DX4/100	10.4" Dual Scan	810MB	4899
486DX4/100	10.4" Active	340MB	4999
486DX4/100	10.4" Active	540MB	5349
486DX4/100	10.4" Active	810MB	5799
486DX4/100	10.4" Active	540MB	6349*
486DX4/100	10.4" Active	810MB	6799*

*Features Built-In CD-ROM drive

More IBM Notebooks

Processor	Screen	HD	Price
IBM ThinkPad 360 & 360E			
486SL/33	8.4" Active	340MB	\$1999
486DX2/50	9.5" Dual Scan	340MB	2699
486DX2/50	9.5" Dual Scan	540MB	3049
486DX2/50	8.4" Active	340MB	3099
486DX2/50	8.4" Active	540MB	3449

PCM 6/95A

Processor	Screen	HD	Price
IBM ThinkPad 701			
486DX2/50	10.4" Dual Scan	360MB	\$3799
486DX2/50	10.4" Dual Scan	540MB	4149
486DX2/50	10.4" Active	360MB	4799
486DX2/50	10.4" Active	540MB	5149
486DX4/75	10.4" Dual Scan	360MB	4399
486DX4/75	10.4" Dual Scan	540MB	4749
486DX4/75	10.4" Active	360MB	5299
486DX4/75	10.4" Active	540MB	5649

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- 10.4" Active & Dual Scan
- Built-in AC adapter - small, sleek design & reduced weight
- Integrated Accupoint - small, accurate & easy to use

Processor	Screen	HD	Price
486DX4/75	10.4" Dual Scan	500MB	\$3539
486DX4/75	10.4" Active	500MB	4679

T2150 as low as
\$3539



**75MHz
Pentium**



T4900

T4900CT

- 75MHz Pentium - for blazing performance
- 10.4" Active Matrix display
- Built-in 16-bit sound, microphone, speaker & MIDI

Processor	Screen	HD	Price
Pentium 75	10.4" Active	772MB	\$5499

NEW!



T2100

T2100

- Integrated Accupoint - small, accurate & easy to use
- Built-in AC adapter - small, sleek design & reduced weight
- 10.4" Dual Scan display

Processor	Screen	HD	Price
486DX2/50	9.5" Mono	250MB	\$1439
486DX2/50	10.4" Dual Scan	330MB	2249
486DX2/50	8.4" Active	330MB	3099

Other Toshiba Notebooks



T4800

Processor	Screen	HD	Price
T4800CT			
486DX4/75	9.5" Active	500MB	\$3559
T4850CT			
486DX4/75	10.4" Active	500MB	\$3889
486DX4/75	10.4" Active	772MB	4099
T3600			
486DX2/50	8.4" Active	500MB	\$3719

T3600
\$3719



TEXAS INSTRUMENTS



TravelMate 5000

TravelMate 5000

- 10.4" Active Matrix display with 2MB Video RAM
- 10.5" Dual Scan display with 2MB Video RAM
- 65K colors on notebook display
- Built-In Dual Lithium-Ion batteries
- 16-bit Sound card, speaker, microphone & MIDI
- User Replaceable 772MB Hard Drive (Active)
- User Replaceable 500MB Hard Drive (Dual Scan)
- Infrared port for wireless connections

Processor	Screen	HD	Price
Pentium 75	10.5" Dual Scan	500MB	\$4999
Pentium 75	10.4" Active	772MB	5599

TravelMate
4000M
Shown with
optional
Docking
Station.



TravelMate 4000M

- Brilliant color display
- 16-bit sound card
- Integrated pointing device
- 2 Type II Hard Type III PCMCIA slot

Processor	Screen	HD	Price
486DX2/50	9.5" Dual Scan	340MB	\$2119
486DX2/50	8.4" Active	455MB	2379
486DX4/75	9.5" Dual Scan	455MB	2459
486DX4/75	8.4" Active	340MB	2729
486DX4/75	8.4" Active	455MB	2979
486DX4/100	9.5" Active	525MB	3939

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Bravo MS Pentium 75 540MB 8MB	1779
Bravo MS Pentium 100 540MB 8MB	2049
Bravo MS Pentium 100 1GB 16MB CD	2649

Canon

Innova 486D2 66 540M BM 21-CD 14.4 FAX	1379
Innova Pentium 75 850M BM 41-CD 14.4 FAX	1869
Innova Pentium 90 1.3GB BM 41-CD 14.4 FAX	2399

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ProLine 486DX2 50 270MB 8MB PC	1329
ProLine 486DX4 100 420MB 8MB PC	1699
ProLine Pentium 75 420MB 8MB PC	1899
ProLine Pentium 90 420MB 8MB PC	2229
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Acerline 810N 4.95 250M 10.4" Pw Cr	1899
Acerline 810 4.75 510M 10.3" Pw Cr	2679
Acerline 910 4.75 510M 10.4" Act Cr	3099

Canon

Notetop 486SX 33 340M 4M Mono	1399
Notetop 486SX 33 340M 4M Color	2029
Notetop 486DX4 75 500M 8M Color	3499
Notetop 486DX4 100 810M 8M Color	3699

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Centura AERO SX33 250M STN Cr	1499
Centura 425CA 209M Act Cr	2499
Centura 410C DX2 50 350M Passive Cr	2379
Centura 410C DX2 50 350M Active Cr	2849
ELITE DX2 40 170M 4M Act Cr	2699
ELITE DX2 50 340M 8M Act Cr	4379
ELITE DX4 75CX 510M 8M Act Cr	5099

IBM

ThinkPad 360C DX2 50 340M TFT Cr	2949
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ThinkPad 701C SX DX2 50 540M Cr	3999
ThinkPad 701C DX4 75 540M Cr	5499
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Verio M DX4 75C 340M 8M Act Cr	3749
Verio M DX4 100 340M 8M Act Cr	4079

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75MHz Pentium!

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TM4000M DX2 50 455M 4M Act Cr	2379
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TM4000M DX4 75 455M 4M Pw Cr	2449
TM4000M DX4 100 524M 4M Act Cr	3699
TM5000 Pentium 75 500M 8M Act Cr	4679

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T2100CS

10.4" Standard Color Display

T2100 DX2 50 250M Mono	1549
910CS SX33 200M 4M STN Cr	1749
910CS SX33 200M 4M STN Cr	2225
910CS SX33 200M 4M STN Cr	3699
910CS SX33 200M 4M STN Cr	4659

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Andal 432E 14" White VGA Monochrome 100

CTX

CTX 14" 1024x768 20mm	225
CTX 15" 1280x1024 MPRI 20mm	319
CTX 17" 1280x1024 27mm Digital	629

GoldStar

Goldstar 1455DL 14" 1324x768 30mm	199
Goldstar 1725 17" 1280x1024 27mm	639

OPTIQUEST

Optiquest 2000 DC 15" 1280x1024 27mm	389
Optiquest 4000 DC 17" 1280x1024 27mm	679
Optiquest 4000 TC 17" Trinitron 25mm	799

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Diamond Pro17FS 17" 1280x1024 26mm	699
Diamond Pro21TX 21" 1600x1200 30mm	1879

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Award-Winning Selection!

MF-8115 15" 1280x1024 20mm	379
MF-8517A 17" 1280x1024 20mm	779
MF-8221 21" 1600x1200 26mm	1899
MF-8621 21" 1600x1200 26mm	2299
MF-9121 21" 1600x1200 30mm	1899

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DX17F 17" 1280x1024 26mm	619
MAX17F 17" 1600x1280 26mm	899
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F2-17 17" 26mm 1600x1200 TCO	949
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T2-17 17" 25mm 1280x1024 TCO	1299
T2-17 25mm 1280x1024 TCO	989
T2 20 20" 30mm 1280x1024 TCO	1989
TX2 21 21" 26mm 1600x1200 TCO	2099

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XP15 XP17 XP21 826 1197 2447	

NOKIA

449E 15" 1280x768 28mm	459
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447X 17" 1600x1200 25mm	1019
445X 21" 1600x1200 25mm TCO	2499

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ScanMaker II SP Color w/Onimage Dr	525
ScanMaker II Color 1200dpi	525
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Polaroid

Sprint Scan 35	1999
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Hercules Stargary 64MB PCI or VLB	259
Hercules Stargary 128MB PCI or VLB	289
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Speedstar Pro PCI & VLB 1MB 2MB	105-185
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Hayes

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Optima 28.8 w/fax w/ act V.34	389/219
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KJ444 4x4x4 14.4 PCMCIA	169
KJ2288 4x4x4 28.8 PCMCIA V.34	349
ES11447 14.4 14.4 PCMCIA 1987 Com	399

Robotics

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Spontstar 28.8 V.34 w/ act	224
Spontstar 28.8 V.34 w/ act	239
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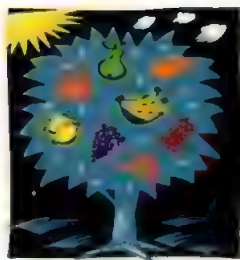
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Dec. 6, '94

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— PC Magazine,
Nov. 22, '94

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— PC Magazine,
Dec. 26, '94

"Notebook computer design and multimedia features mesh nicely in the CD-BOOK 800 series from MPC Technologies, Inc."



— Computer Shopper, Feb. '95

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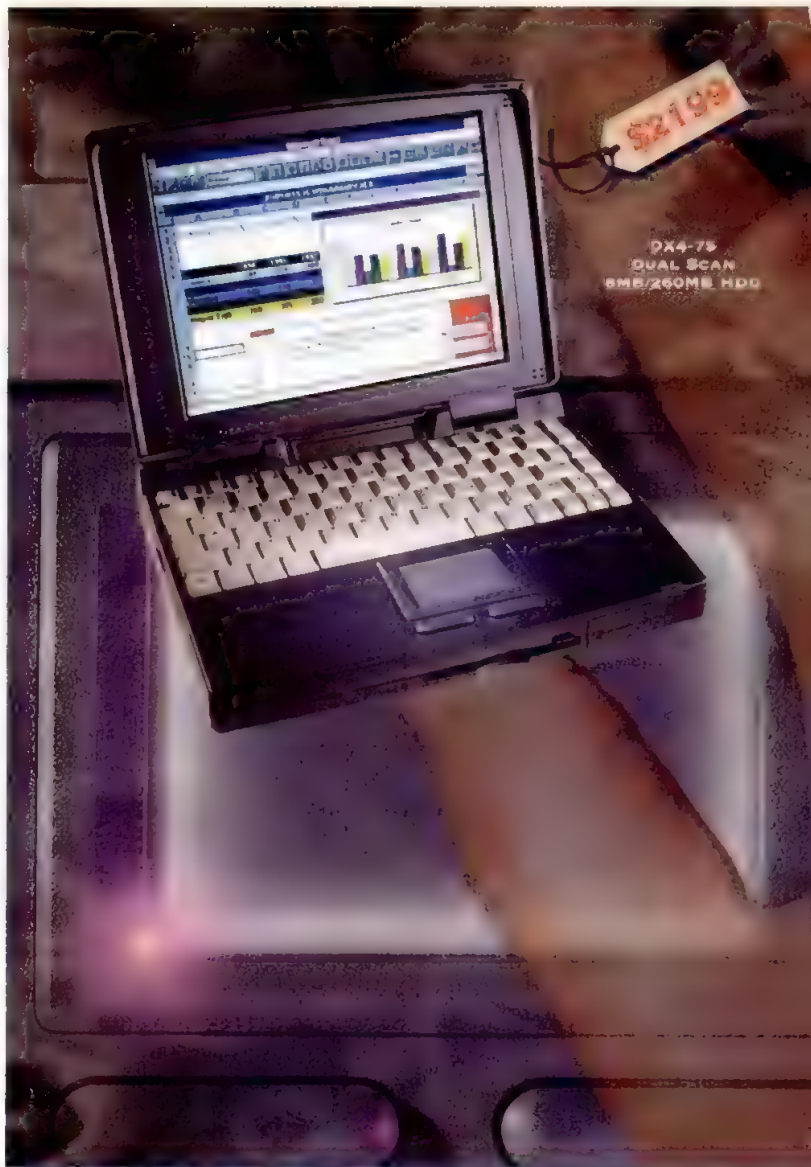


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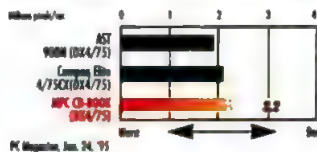


— PC Computing, Jan. '95



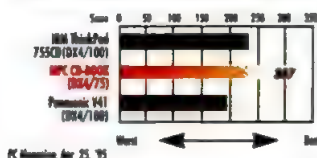
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MPC CD-BOOK
VS.
PANASONIC V41

DISK WINMARK 95



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Windows applications	6000	6000
DOS applications	6000	6000
Word Processor	6000	6000
Desktop Replacement	6000	6000
100 MHz, 8MB RAM, 450MB HDD		
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PC Magazine, Jan. 24, '95

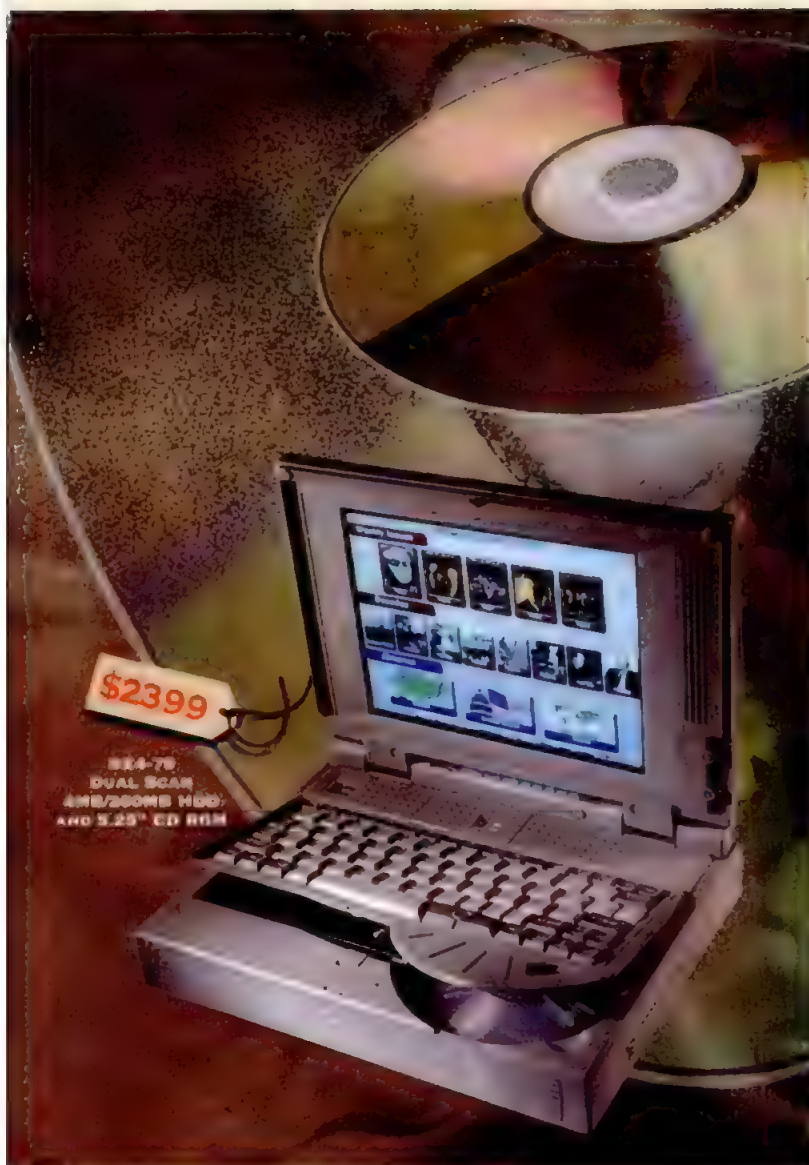
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- 1MB Video Local bus
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- System status panel
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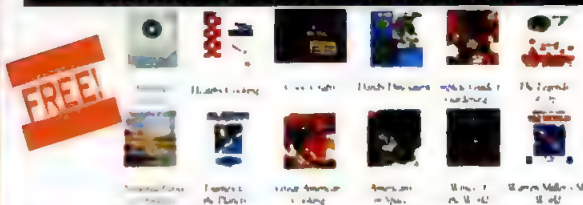
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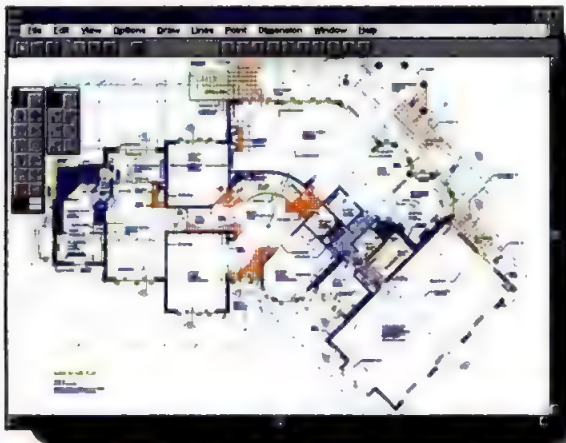
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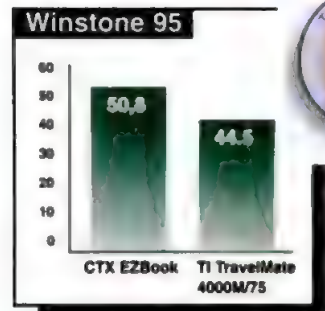
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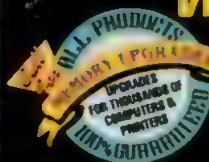
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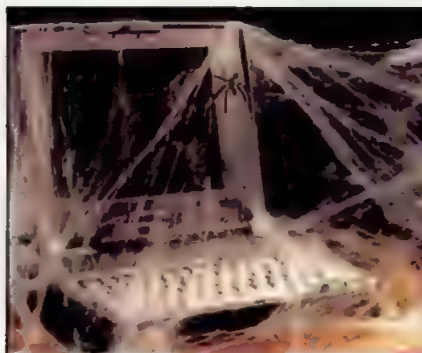
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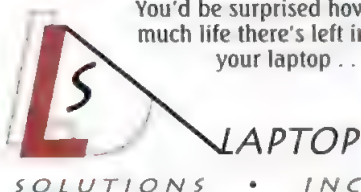


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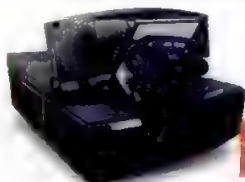
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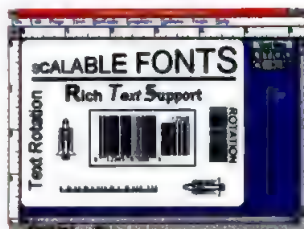
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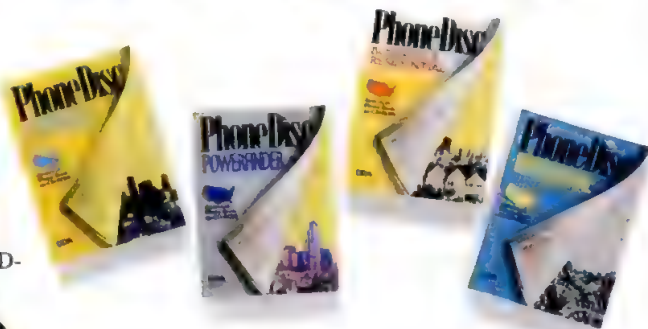
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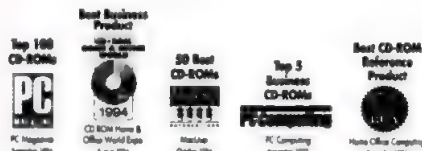
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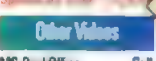
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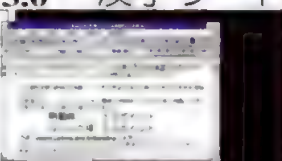
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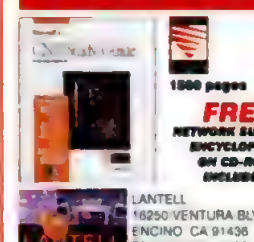
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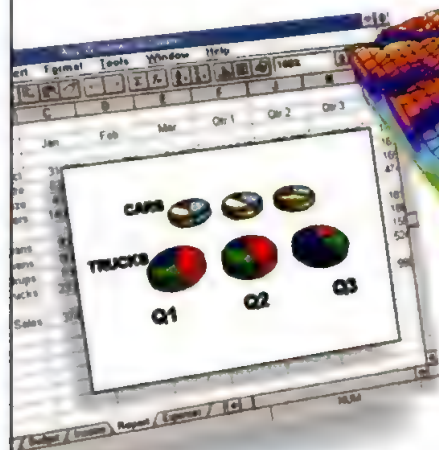
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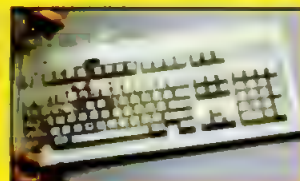
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751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800
801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850
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1. Do you work in a DP/MIS dept.?
01. ☐ Yes 02. ☐ No

2. Please indicate your company or organization's primary business activity: (Check one)

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- 02. ☐ Manufacturer—Aerospace
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- 05. ☐ Computer Consultant
- 06. ☐ Computer Retailer/VAR/VAD Distributor
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- 12. ☐ Research and Development
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- 10. ☐ Production
- 11. ☐ Education/Training
- 12. ☐ Marketing/Sales
- 13. ☐ Medical/Legal
- 14. ☐ Admin./Mgmt.

4. Is your company a reseller?
01. ☐ Yes 02. ☐ No

5. For how many IBM PCs and compatibles do you specify brands of products:

- 01. ☐ 10 or less 03. ☐ 26-99
- 02. ☐ 11-25 04. ☐ 100 or more

6. Are there any PCs in your office?

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- 02. ☐ Linked to mini
- 03. ☐ Networked together

7. Please check the equipment currently installed at your location: (Check all that apply)

- 01. ☐ IBM or Compatible PCs
- 02. ☐ IBM or Compatible Mainframes
- 03. ☐ IBM or Compatible Minis
- 04. ☐ Macintosh
- 05. ☐ CD-ROM
- 06. ☐ Windows

8. Do you plan to buy any PC products?

- 01. ☐ Now 03. ☐ In 7 to 12 months
- 02. ☐ In 4 to 6 months 04. ☐ No definite plans

9. Number of employees in your entire company:

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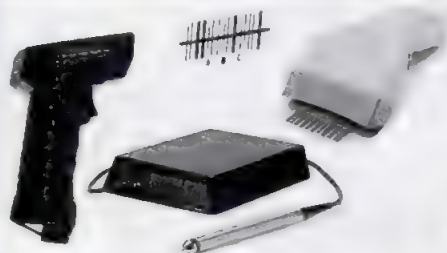
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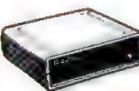
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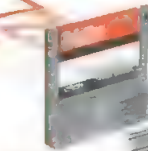


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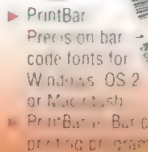
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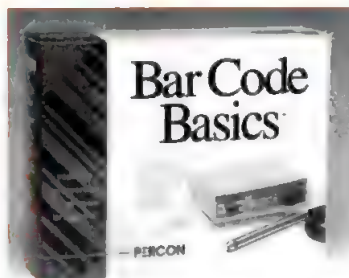
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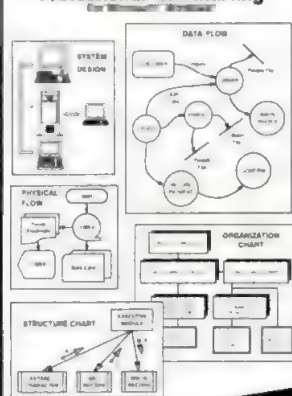
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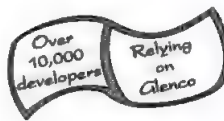
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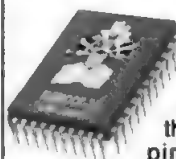
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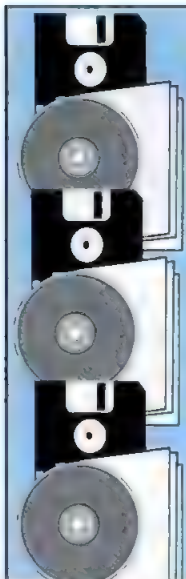


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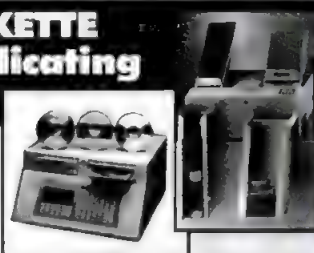
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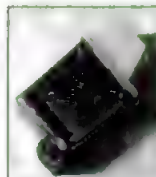
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YOU ALSO HAVE A RIGHT TO BE EXCLUDED FROM THE CLASS AS DETAILED IN THE NOTICE OF SETTLEMENT OF CLASS ACTION. IF YOU WISH TO BE EXCLUDED FROM THE CLASS YOU MUST FOLLOW THE PROCEDURES OUTLINED HEREIN.

IF YOU DO NOT REQUEST EXCLUSION FROM THE CLASS AND THIS SETTLEMENT BECOMES EFFECTIVE YOU WILL BE GIVEN CERTAIN RIGHTS IN EXCHANGE FOR THE RELINQUISHMENT OF CERTAIN CLAIMS. THAT PROCEDURE WILL NOT GIVE YOU THE RIGHT TO A TRIAL ON SUCH CLAIMS AND YOU WILL WAIVE YOUR RIGHT TO A TRIAL ON SUCH CLAIMS.

AS PART OF THE SETTLEMENT, A MECHANISM WILL BE ESTABLISHED TO RESOLVE CLAIMS FOR CERTAIN TYPES OF OUT OF POCKET EXPENSES. THIS MECHANISM IS THE EXCLUSIVE MEANS TO PURSUE SUCH CLAIMS. IF YOU DO NOT PURSUE SUCH CLAIMS THROUGH THAT MECHANISM, YOU WILL BE BARRED FROM PURSUING SUCH CLAIMS. IF YOU PURSUE SUCH CLAIMS THROUGH THAT MECHANISM YOU WILL NOT BE GIVEN A TRIAL ON THOSE CLAIMS. YOUR CLAIMS WILL BE DECIDED BY A SETTLEMENT ARBITRATOR.

If you properly request exclusion from the Settlement Class, the terms of the settlement will not be binding as to you.

NOTICE IS HEREBY GIVEN, pursuant to California Code of Civil Procedure § 382 and California Civil Code § 1781 and an Order of the Superior Court of the State of California for the County of Santa Clara dated March 24, 1995, that a hearing will be held before the Honorable Alden Danner in Department 15 at 191 North First Street, San Jose, California at 9:00 a.m. on June 22, 1995 (the "Settlement Hearing") to determine: (1) whether the proposed settlement (the "Settlement") of the above-captioned litigation (the "Consolidated Action") as set forth in a Stipulation of Settlement dated March 21, 1995 (the "Settlement Stipulation") is fair, reasonable and adequate; (2) whether a final judgment should be entered dismissing the Consolidated Action on the merits as to Intel with prejudice to Plaintiffs and all members of the Settlement Class who do not request exclusion; and (3) whether applications to be made by the attorneys for Plaintiffs and the Settlement Class for payment of fees and reimbursement of expenses should be approved by the Court.

In brief, the Settlement Stipulation provides for Intel to:

1. Exchange, upon request, the current version of the Pentium® processor for an updated version in which the FPU Imperfection (as defined in the Settlement Stipulation) is corrected, free of charge during the life of the computer, by calling 1-800-628-8686;
2. Maintain 1-800 numbers for ordering replacement processors, providing information and resolving problems, including information about how to obtain a replacement processor, the status of the request, and instructions on how to replace the processor;
3. Contract for Local Service Centers nationwide that will provide for trained technicians who will install replacement Pentium® processors (information about locations of the nearest Local Service Center can be obtained by calling 1-800-628-8686);
4. Make available a computer program that will determine whether a Pentium® processor has the FPU Imperfection in the floating-point divide unit (information about how to obtain a copy of this program may be obtained by calling 1-800-628-8686 or on Intel's Home Page on the World Wide Web (<http://www.intel.com>) and
5. Establish a mechanism to resolve claims for Out of Pocket Expenses (as that term is defined in Exhibit B to the Notice of Settlement of Class Action), which will provide for written claims to be filed with Intel, and if not resolved with Intel, for resolution of the claim by an Arbitrator, at no cost to the claimant (although the arbitrator can assess some fees if the claim is found to be frivolous).

The above is only a short summary of the proposed settlement, all of which is discussed more fully in the detailed printed Notice of Settlement of Class Action. If you are a member of the Settlement Class and desire additional information or a detailed printed Notice of Settlement, you may obtain such information or copies by calling Intel at 1-800-628-8686 and asking for a copy to be mailed to you. In addition, a full copy of the Notice of Settlement is available at Intel's Home Page on the World Wide Web (<http://www.intel.com>). You may also obtain a copy by writing to either Class Counsel at the following addresses:

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ALL QUESTIONS RELATING TO THE PROPOSED SETTLEMENT SHOULD BE DIRECTED TO CLASS COUNSEL. PLEASE DO NOT CONTACT THE COURT OR THE CLERK'S OFFICE FOR INFORMATION.

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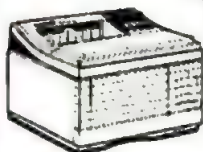
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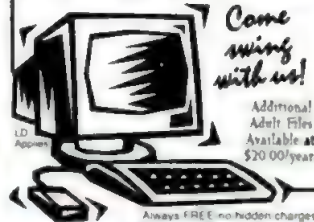
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Advertisers' Index COMPANIES

Reader Service No.	Advertiser	Page
293	3 Com Corporation	221
*	Acer America	77-81
226	ADI Systems Inc	45
017	Advanced Micro Devices	14-15
249	AEC Software	250
*	America Online, Inc.	377-378
162	American Power Conversion	68
025	American Small Business Computers	333
235	AMS	304-305
336	Arlington Computer Products	302-303
918	Artisoft Inc.	26-27
902	Asante Technologies	NE30
215	AST Research	165
234	AST Research	167
*	AT&T	114-115
127	ATI Technologies Inc	18
012	Austin Direct	146-149
292	Caere Corporation	6
245	Caere Corporation	178
*	Canon Computer Systems	64-65
*	Canon Computer Systems	108-109
894	Cheyenne Software	NE17
073	Colorado Memory Systems	96
*	Communication Intelligence	76
137	Compaq Computer Corporation	70-71
*	Compaq Computer Corporation	106-107
*	Compaq Computer Corporation	118-119
308	Compaq Computer Corporation	212-213
144	CompUSA Direct	270-271
274	CompuServe	309-311
348	Computer Associates	20-21
109	COMPUTER DISCOUNT WAREHOUSE	295
159	COMPUTER DISCOUNT WAREHOUSE	296-297
360	COMPUTER DISCOUNT WAREHOUSE	298-299
158	Computer Library	281
925	Connectix	171
007	Connectix	253
322	Corel Corporation	67
011	Corel Corporation	122
004	Corel Corporation	208
020	Corel Corporation	254
267	CTX International	41
935	Datastorm Technologies	252
*	Dell Computer Corporation	C5-C8
*	Dell Computer Corporation	126-127
*	Dell Computer Corporation	232-233
*	Dell Computer Corporation	387-390
050	Delphi Internet Services	384
912	Delrina Technology	NE5
931	Digital Equipment Corporation	NE11
*	Epson America	10-11

Reader Service No.	Advertiser	Page
266	Ergo Computing, Inc.	84
243	File ABC	241
014	First Source International	315
272	First Source International	316-317
861	FTP Software Inc.	NE18
*	Gateway 2000	133-141
*	Gateway 2000	223-226
247	Genoa Systems	385
391/138	H.Co Memory Upgrades	331
*	Hewlett Packard - Colorado	NE14-NE15
*	Hewlett Packard Peripheral Group	34-35
*	Hewlett Packard	57-59
*	Hewlett Packard	180-183
*	IBM Corporation	186-187
*	IBM PC Corporation	52-53
016	Infomaging	190-191
219	Insight Direct	328-329
027	Insight Direct	374
*	Intel Corporation	5
*	Intel Corporation	98-99
*	Intuit, Inc.	125
*	Intuit, Inc.	258
106	Kingston Technology	161
869	Kyocera	NE26-NE27
019	L.A. Trade	320
852	Lantronix	NE7
100	Lexmark International	47
*	Lotus Development Corporation	168-169
003	MACTECH CORPORATION	111
018	MegaHaus	294
321	Megahertz Corp	117
855	Micro Solutions Computer Products	314
164	Micron Computer, Inc.	153-158
203	Micron Computer, Inc.	301
924	Micron Computer, Inc.	NE2-NE3
*	Microsoft	2-3
*	Microsoft	176-177
*	Microsoft	194-195
*	Microsoft	228-229
*	Microsoft	NE8-NE9
*	Microsoft	NE25
010	Midwest Computer Works	324-325
398	Midwest Micro	285-291
329	Mitra	334
177	MPC Technology, Inc.	326-327
*	Nanao Corporation	28
217	NEC Technologies	33
153	NEC Technologies	C2-p1
157	NEC Technologies	130-131
275	NETCOM	63
877	NetManage, Inc.	NE28

Reader Service No.	Advertiser	Page
*	Nokia	23
*	Okidata	82
*	Okidata	206
*	Oracle Corp.	NE22-NE23
926	Palindrome	NE20
*	PC Connection	330
080	PC Power & Cooling	94
092	PCs Compleat	321
268	PCs Compleat	322-323
024	PerComp Microsystems, Inc.	312-313
053	PerComp Microsystems, Inc.	319
867	Performance Technology	NE34
853	Persoft	NE13
015	Phillips	16-17
098	Pinnacle Micro	43
148	Primavera Systems	60
067	Princeton Graphics Systems	318
*	Prodigy Services Co.	197-198
257	Profound Inc.	94
*	QMS	189
278	Samsung	86-87
*	Scitor Corporation	55
399	Sigma Designs, Inc.	383
248	Simple Technology	92
043	SPSS, Inc.	293
061	STAC Electronics	263
919	StarBase	NE6
081	Sunshine Computers	332
906	Symantec Corporation	90
911	Symantec Corporation	239
001	Tektronix Inc.	74
353	Texas Instruments	100-101
379	Toshiba America	236-237
367	Universal Data Systems	260
*	US Robotics Inc.	36
210	USA Flex	306-307
002	VideoLogic Inc.	380-381
*	Visio	275
373	Visual Software	251
237	Western Digital	13
*	WordPerfect/Novell Applications	217-219
942	Xerox Corporation	203
*	Zenith Data Systems	72-73
063	Zeos Int'l	24-25
125	Zeos Int'l	88
155	Zeos Int'l	48A-48F
* No Reader Service #. Please Call Advertiser For Information.		

Advertisers' Index PRODUCTS

Reader Service No.	Company	Product	Page	Reader Service No.	Company	Product	Page
ACCELERATION BOARDS				ELECTRONIC MAIL			
	Intel Corporation	Intel Overdrive Processor	118-119	877	NetManage Inc.	Chameleon 4.0	NE28
ADD-ON BOARDS				ENTERTAINMENT SOFTWARE			
247	Genoa Systems	Graphic Boards	385	274	CompuServe	On Line Services	308-311
391/138	H Co Memory Upgrades	Memory PCMCIA	331	011	Correl Corporation	Gallery Combo	122
					Microsoft	Microsoft Publisher	176-177
BACKUP SOFTWARE				FAX SOFTWARE			
931	Digital Equipment Corporation	Storageworks	NE11	935	Datascram Technologies	ProComm Plus for Windows	252
855	Micro Solutions Computer Products	Tape Backup	314	016	Infomaging	3D Fax	190-191
BRIDGES/ROUTERS/GATEWAYS				FAX/MODEM			
902	Acorn Technologies	101 Hubs	NE30	014	First Source International	Notebooks, Memory, Peripherals	315
CAD/CAM				272	First Source International	Memory, Software, Notebooks	316-317
025	American Small Business Computers	Design CAD 2D	333	321	Megahertz Corp.	XJack PCMCIA V.34 Modem	117
CD-ROM				081	Sunshine Computers	Notebooks/Laptops	332
158	Computer Library	Computer Select	281	367	Universal Data Systems	TBD	290
004	Corel Corporation	HP Photo Paint	206	FILE SYSTEMS & ACCESS METHODS			
020	Corel Corporation	Photo Stock Library	254	018	Infomaging	3D Fax	190-191
272	First Source International	Memory, Software, Notebooks	316-317	FINANCIAL PLANNING SOFTWARE			
219	Insight Direct	CDROM	328-329		Intuit, Inc.	QuickBooks	125
027	Insight Direct	CDROM	374		Intuit, Inc.	Galsby	258
855	Micro Solutions Computer Products	CDROM	314	FLOWCHARTING			
153	NEC Technologies	CDROM	C2-p1		Visio	Visio Graphics Software	275
CHIPS/PROCESSORS				GRAPHICAL INTERFACE			
017	Advanced Micro Devices	Microprocessor	14-15	275	NETCOM	Personal Internet Services	83
272	First Source International	Memory, Software, Notebooks	316-317	GRAPHICS SOFTWARE			
391/138	H Co Memory Upgrades	Memory PCMCIA	331	292	Care Corporation	OmniPage	8
	Intel Corporation	Intel Pentium Processor	5	245	Care Corporation	Wordscan	178
	Intel Corporation	Intel Overdrive Processor	98-99	322	Corel Corporation	Draw 5	67
106	Kingston Technology	Memory	161	011	Corel Corporation	Gallery Combo	122
019	L.A. Trade	Memory	320		Microsoft	Microsoft PowerPoint	2-3
COMMUNICATIONS SOFTWARE				217	Nano Corporation	Monitors	28
935	Datascram Technologies	ProComm Plus for Windows	252		NEC Technologies	Multimedia Theatre	33
912	Delima Technology	WinFax Pro for Networks	NE5	373	Visio	Visio Graphics Software	275
891	FTP Software Inc.	Explore On Net	NE18		Visual Software	Visual Reality	251
016	Infomaging	3D Fax	190-191	HARD DRIVES			
	Microsoft	Microsoft Back Office	228-229	219	Insight Direct	Hard Drives	328-329
677	NetManage Inc.	Chameleon 4.0	NE28	027	Insight Direct	Hard Drives	374
853	Persoft	SmartTerm	NE13	855	Micro Solutions Computer Products	Disk Drive	314
906	Symantec Corporation	pcAnywhere	90	237	Western Digital	Caviar	13
	WordPerfect/Novell Applications	Perfect Office	217-219	HARDWARE			
COMPATIBLE KEYBOARDS					3 Com Corporation	EtherLink Portable	221
	Microsoft	Mouse & Nexus Keyboard	194-195	017	Advanced Micro Devices	Microprocessor	14-15
COMPUTERS/COMPATIBLES					Canon Computer Systems	Canon iLuv 7D Printer	64-65
	Acer America	PCs and Notebooks	77-81	144	Canon Computer Systems	Canon IX-4015 Scanner	108-109
336	Arlington Computer Products	Peripherals	302-303	144	CompUSA Direct	Mail Order	270-271
215	AST Research	Computers	165	267	CompUSA Direct	Mail Order	270-271
234	AST Research	Computers	167		CTX International	CTX Notebooks	41
	ATI	ATI GIS PCs	114-115		Dell Computer Corporation	Dell Notebook Computers	126-127
012	Austin Direct	Austin Desktops	146-149		Dell Computer Corporation	Dell Desktops and Notebooks	387-388
137	Compaq Computer Corporation	Desktops - Prolinea	70-71	931	Digital Equipment Corporation	Storageworks	NE11
	Compaq Computer Corporation	Compaq Prolinea	108-107		IBM PC Corporation	Hardware	52-53
	Compaq Computer Corporation	Compaq Notebooks	118-119		Intel Corporation	Intel Overdrive Processor	98-99
308	Compaq Computer Corporation	Pro Unit Servers	212-213	852	Kingston Technology	Memory	161
144	CompUSA Direct	Mail Order	270-271	018	Lantronix	Multiprotocol Print Server	NE7
144	CompUSA Direct	Mail Order	270-271	321	Lantronix	Drives/Storage	294
109	COMPUTER DISCOUNT WAREHOUSE	Hardware	295		Megahertz Corp.	XJack PCMCIA V.34 Modem	117
159	COMPUTER DISCOUNT WAREHOUSE	Hardware	296-297	308	Microsoft	Mouse & Nexus Keyboards	194-195
380	COMPUTER DISCOUNT WAREHOUSE	Hardware	298-299	028	Midwest Micro	Notebooks, Desktops, Peripherals	285-291
	Dell Computer Corporation	Dell Desktops and Notebooks	C5-C8	157	Mira	Mira Notebooks	334
	Dell Computer Corporation	Dell Notebook Computers	126-127	278	NEC Technologies	NEC Monitors	130-131
	Dell Computer Corporation	Dell Desktops and Notebooks	387-388	248	Samsung	Samsung Notebooks	86-87
	Dell Computer Corporation	Dell Desktops and Notebooks	387-388	367	Sample Technology	PC Cards	92
	Gateway 2000	Pentium PCs	133-141	002	Universal Data Systems	TBD	260
	Gateway 2000	PCs	223-226		VideoLogic Inc.	GraphicStar 64 Bit Video Cards	380-381
	Hewlett Packard	HP Color PCs	57-59	INFORMATION MANAGERS			
	Hewlett Packard	HP Jet Direct	180-183		Lotus Development Corporation	Notes/SmartSuite	188-189
	IBM Corporation	Thinkpad	186-187	INPUT DEVICES			
	IBM PC Corporation	RS/6000	52-53		Communication Intelligence	Handwriter for Windows	78
219	Insight Direct	Mail Order Systems	328-329		Epson America	Epson ES-1200C Pro Scanner	10-11
027	Insight Direct	Mail Order Systems	374		Microsoft	Mouse & Nexus Keyboards	194-195
	Intel Corporation	Intel Pentium Processor	5	LAN ADAPTER BOARDS			
164	Micro Computer, Inc.	Millennium PCs	153-155	293	3 Com Corporation	EtherLink Portable	221
010	Midwest Computer Works	PCs	324-325	LAPTOPS/PORTABLE COMPUTERS			
398	Midwest Micro	Desktops	285-291		Acer America	PCs and Notebooks	77-81
092	PCs Complete	Mail Order	321	235	AMS	Notebooks	304-305
268	PCs Complete	Mail Order	322-323	215	AST Research	Computers	165
024	PerComp Microsystems Inc.	Mail Order	312-313	234	AST Research	Computers	167
053	PerComp Microsystems Inc.	Mail Order	319	012	Austin Direct	Austin Notebooks	146-149
379	Toshiba America	Notebook Computers	236-237		Compaq Computer Corporation	Compaq Prolinea	108-107
210	USA Fax	Connecting PCs	306-307		Compaq Computer Corporation	Compaq Notebooks	118-119
	Zenith Data Systems	Zenith Multimedia	72-73	144	CompUSA Direct	Mail Order	270-271
125	Zeos Int'l	Zeos vs. Toshiba	88	109	CompUSA Direct	Mail Order	270-271
155	Zeos Int'l	Jack Panther Pentium PCs	484-488	159	COMPUTER DISCOUNT WAREHOUSE	Laptops	296-297
DATA BASE MANAGERS				360	COMPUTER DISCOUNT WAREHOUSE	Laptops	298-299
348	Computer Associates	Open Ingres	20-21	267	CTX International	CTX Notebooks	41
	Microsoft	Microsoft Back Office	228-229		Dell Computer Corporation	Dell Desktops and Notebooks	C5-C8
	Oracle Corp.	Workgroup Server	NE22 NE23		Dell Computer Corporation	Dell Notebook Computers	126-127
DATA COMPRESSION SOFTWARE					Dell Computer Corporation	Dell Desktops and Notebooks	387-388
061	STAC Electronics	Stac	263	266	Ergo Computing Inc.	PowerBook 2400	84
DESK TOP PUBLISHING				014	First Source International	Notebooks, Memory, Peripherals	315
322	Corel Corporation	Draw 5	67		Gateway 2000	Notebooks	133-141
322	Corel Corporation	Draw 5	67		Gateway 2000	Notebooks	223-226
011	Corel Corporation	Gallery Combo	122	321	Hewlett Packard	OmniBook 600 OmniBook 4000	57-59
	Microsoft	Microsoft Publisher	176-177	010	Megahertz Corp.	XJack PCMCIA V.34 Modem	117
DISK BACKUP & TAPE DRIVES				398	Midwest Computer Works	Hardware PCs	324-325
	Hewlett Packard - Colorado	HP DAT	NE14-NE15	329	Midwest Micro	Notebooks	285-291
855	Micro Solutions Computer Products	Tape Backup, Desk Drive	314	177	Mira	Mira Notebooks	334
926	Palindrome	Tape Backup	NE20	278	MPC Technology Inc.	Multimedia Notebooks	326-327
DISPLAYS/MONITORS				081	Samsung	Samsung Notebooks	86-87
226	ADI Systems Inc.	Monitors	45	353	Sunshine Computers	Notebooks/Laptops	332
010	Midwest Computer Works	Monitors	324-325		Texas Instruments	TI Notebooks	100-101
	Nano Corporation	Monitors	28	279	Toshiba America	Notebook Computers	236-237
157	NEC Technologies	NEC Monitors	130-131	310	USA Fax	Notebooks	306-307
	Nokia	Monitors	23		Zenith Data Systems	Zenith Multimedia	72-73
015	Phillips	Monitors	16-17	063	Zeos Int'l	Mendian Color Notebooks	24-25
067	Princeton Graphics Systems	Princeton Graphics Monitors	318				

Advertisers' Index PRODUCTS

Reader Service No.	Company	Product	Page	Reader Service No.	Company	Product	Page
LOCAL AREA NETWORKING				ON LINE DATABASE			
293	3 Com Corporation	EtherLink Portable	221	274	America Online, Inc.	America Online	377-378
894	Cheyenne Software	ARCserve	NE17	050	CompuServe	On Line Services	309-311
308	Compaq Computer Corporation	ProLiant Servers	212-213	275	Delphi Internet Services	Internet Mail Gateway	384
348	Computer Associates	Open Ingres	20-21	257	NETCOM	Personal Internet Services	63
109	COMPUTER DISCOUNT WAREHOUSE	Networking Products	295		Prodigy Services Co.	Prodigy Online Services	197-198
159	COMPUTER DISCOUNT WAREHOUSE	Networking Products	296-297		Profound Inc.	Profound	94
360	COMPUTER DISCOUNT WAREHOUSE	Networking Products	298-299	OPERATING SYSTEMS			
912	Delrina Technology	WinFax Pro for Networks	NE5	918	Artisoft Inc.	LANTastic 6.0	26-27
931	Digital Equipment Corporation	StorageWorks	NE11	OPTICAL PERIPHERALS			
861	FTP Software Inc.	Explore On Net	NE18	018	MegaHaus	Drives/Storage	294
	IBM PC Corporation	RS-6000	52-53	217	NEC Technologies	Multimedia Theatre	33
852	Lantronix	Multiprotocol Print Server	NE7	098	Pinnacle Micro	Optical Drives	43
100	Lexmark International	Optra	47	ORGANIZATIONAL SOFTWARE			
867	Performance Technology	Instant Internet	NE34	243	File ABC	File ABC	241
248	Simple Technology	PC Cards	92		Visio	Visio Graphics Software	275
919	StarBase	StarBase	NE6	ORGANIZATIONS/SERVICES			
911	Symantec Corporation	Enterprise Developer	239	274	CompuServe	On Line Services	309-311
942	Xerox Corporation	4500 Network Laser	203		Microsoft	Authorized Technical Education	NE25
MAIL ORDER				275	NETCOM	Personal Internet Services	63
	Acer America	PCs and Notebooks	77-81	PC ACCESSORIES			
235	AMS	Notebooks	304-305	855	Micro Solutions Computer Products	Tape Backup, CDROM, Disk Drive	314
336	Arlington Computer Products	Mail Order	302-303	PC DIRECT			
	AT&T	AT&T GIS PCs	114-115	235	AMS	Notebooks	304-305
012	Austin Direct	Austin Notebooks and Desktops	146-149	336	Arlington Computer Products	Peripherals, Mail Order	302-303
	Compaq Computer Corporation	Compaq Prolinea	106-107	274	CompuServe	On Line Services	309-311
	Compaq Computer Corporation	Compaq Notebooks	118-119	109	COMPUTER DISCOUNT WAREHOUSE	Software	295
144	CompuUSA Direct	Mail Order	270-271	159	COMPUTER DISCOUNT WAREHOUSE	Resellers	296-297
144	CompuUSA Direct	Mail Order	270-271	360	COMPUTER DISCOUNT WAREHOUSE	Laptops	298-299
109	COMPUTER DISCOUNT WAREHOUSE	Resellers	295	014	First Source International	Notebooks, Memory Peripherals	315
159	COMPUTER DISCOUNT WAREHOUSE	Resellers	296-297	272	First Source International	Memory, Software, Notebooks	316-317
360	COMPUTER DISCOUNT WAREHOUSE	Resellers	298-299	391/138	H Co Memory Upgrades	Memory, PCMCIA, Fax/Modem, LAN	331
267	CTX International	CTIX Notebooks	41	219	Insight Direct	PCs, CDROM Peripherals	328-329
272	First Source International	Memory, Software, Notebooks	316-317	219	Insight Direct	Mail Order Systems	328-329
391/138	Gateway 2000	Mail Order	133-141	027	Insight Direct	Mail Order Systems	374
	Gateway 2000	Mail Order	223-226	019	Insight Direct	Mail Order Systems	374
	H Co Memory Upgrades	Memory, PCMCIA, Fax/Modem, LAN	331	018	L.A. Trade	Memory	320
219	IBM Corporation	Thinkpad	186-187	018	MegaHaus	Drives/Storage	294
027	Insight Direct	Mail Order	328-329	203	Micron Computer, Inc.	Micron Memory	301
010	Midwest Computer Works	Mail Order	324-325	010	Midwest Computer Works	PCs, Monitors, Reseller	324-325
329	Mitra	Mitra Notebooks	334	398	Midwest Micro	Notebooks, Desktops, Peripherals	285-291
	PC Connection	Mail Order	330	177	Mitra	Mitra Notebooks	334
092	PCs Complete	Mail Order	321	092	MPC Technology, Inc.	Multimedia Notebooks	326-327
268	PCs Complete	Mail Order	322-323	092	PC Connection	Mail Order	330
024	PerComp Microsystems, Inc.	Mail Order	312-313	092	PCs Complete	Mail Order	321
053	PerComp Microsystems, Inc.	Mail Order	319	092	PCs Complete	Mail Order	321
278	Samsung	Samsung Notebooks	86-87	092	PCs Complete	Mail Order	321
081	Sunshine Computers	Notebooks/Laptops	332	092	PCs Complete	Mail Order	321
210	USA Flex	Notebooks, PCs, Peripherals	306-307	024	PerComp Microsystems, Inc.	Mail Order	312-313
063	Zeos Int'l	Meridian Color Notebooks	24-25	053	PerComp Microsystems, Inc.	Mail Order	319
125	Zeos Int'l	Zeos vs. Toshiba	88	053	PerComp Microsystems, Inc.	Mail Order	319
155	Zeos Int'l	Zeos Panthera Pentium PCs	48A-48F	053	PerComp Microsystems, Inc.	Mail Order	319
MASS STORAGE				067	Princeton Graphics Systems	Princeton Graphics Monitors	318
073	Colorado Memory Systems	Mass Storage	96	278	Samsung	Samsung Notebooks	86-87
	Hewlett Packard - Colorado	HP DAT	NE14-NE15	043	SPSS, Inc.	Statistical & Windows Software	293
018	MegaHaus	Drives/Storage	294	081	Sunshine Computers	Notebooks/Laptops	332
MEMORY				210	USA Flex	Notebooks, PCs, Peripherals	306-307
014	First Source International	Notebooks, Memory Peripherals	315	PCMCIA			
272	First Source International	Memory, Software, Notebooks	316-317	014	First Source International	Notebooks, Memory Peripherals	315
391/138	H Co Memory Upgrades	Memory	331	391/138	H Co Memory Upgrades	Fax/Modem, Flash, SRAM, Drives	331
106	Kingston Technology	Memory	161	106	Kingston Technology	Memory	161
019	L.A. Trade	Memory	320	321	Megahertz Corp.	XJack PCMCIA V.34 Modem	117
203	Micron Computer, Inc.	Micron Memory	301	248	Simple Technology	PC Cards	92
061	STAC Electronics	Stac	263		US Robotics Inc.	Sportster V.34	36
MISCELLANEOUS				PERIPHERAL SHARING DEVICE			
274	CompuServe	On Line Services	309-311	852	Lantronix	Multiprotocol Print Server	NE7
855	Micro Solutions Computer Products	Tape Backup, CDROM, Disk Drive	314	PERIPHERALS			
002	Videologic Inc.	GraphixStar 64 Bit Video Cards	380-381	109	COMPUTER DISCOUNT WAREHOUSE	Peripherals	295
MODEMS				159	COMPUTER DISCOUNT WAREHOUSE	Peripherals	296-297
003	MACTECH CORPORATION	Modems	111	360	COMPUTER DISCOUNT WAREHOUSE	Peripherals	298-299
321	Megahertz Corp.	XJack PCMCIA V.34 Modem	117		Epson America	Epson ES-1200C Pro Scanner	10-11
248	Simple Technology	PC Cards	92	014	First Source International	Notebooks, Memory, Peripherals	315
367	Universal Data Systems	TBD	260		Gateway 2000	Peripherals	133-141
	US Robotics Inc.	Sportster V.34	36	219	Gateway 2000	Peripherals	223-226
MULTI-MEDIA				027	Insight Direct	Peripherals	328-329
925	Connectix	QuickCam for Windows	171	100	Insight Direct	Peripherals	374
007	Connectix	RAM Doubler for Windows	253		Lexmark International	Optra	47
004	Corel Corporation	HP Photo Paint	208	398	Microsoft	Mouse & Nexus Keyboards	194-195
020	Corel Corporation	Photo Stock Library	254	015	Midwest Micro	Peripherals	285-291
247	Epson America	Epson ES-1200C Pro Scanner	10-11		Philips	Monitors	16-17
219	Genoa Systems	Graphic Boards	385	367	OMS	Magicolor Printer	189
027	Insight Direct	Multimedia	328-329		Universal Data Systems	TBD	260
027	Insight Direct	Multimedia	374	POWER PROTECTION			
018	MegaHaus	Drives/Storage	294	162	American Power Conversion	Back-UPS	68
177	MPC Technology, Inc.	Multimedia Notebooks	326-327	080	PC Power & Cooling	PowerProtection/Cooling Devices	94
157	NEC Technologies	NEC Monitors	130-131	PRESENTATION SOFTWARE			
399	Sigma Designs, Inc.	Video Capture Boards	383	322	Corel Corporation	Draw 5	67
248	Simple Technology	PC Cards	92		Microsoft	Microsoft PowerPoint	2-3
002	Videologic Inc.	GraphixStar 64 Bit Video Cards	380-381	PRINTER ACCESSORIES			
MULTIMEDIA SOFTWARE				210	USA Flex	Peripherals, Printers	306-307
925	Connectix	QuickCam for Windows	171	PRINTERS			
007	Connectix	RAM Doubler for Windows	253		Canon Computer Systems	Canon BJC-70 Printer	64-65
011	Corel Corporation	Gallery Combo	122		Hewlett Packard Peripheral Group	HP LaserJet	34-35
004	Corel Corporation	HP Photo Paint	208	869	Kyocera	Printer	NE26-NE27
020	Corel Corporation	Photo Stock Library	254	100	Lexmark International	Optra	47
	Microsoft	Microsoft Publisher	176-177		Okidata	Okid LED P4-0317 - OL810e	82
373	Visual Software	Visual Reality	251		Okidata	400E	206
NETWORKING SOFTWARE					QMS	Magicolor Printer	189
918	Artisoft Inc.	LANTastic 6.0	26-27	081	Sunshine Computers	Notebooks/Laptops	332
894	Cheyenne Software	ARCserve	NE17	001	Tektronix Inc.	Tektronix Printers	74
861	FTP Software Inc.	Explore On Net	NE18	210	USA Flex	Printers	306-307
	Microsoft	Microsoft Back Office	228-229	942	Xerox Corporation	4500 Network Laser	203
	Oracle Corp.	Workgroup Server	NE22-NE23	PROGRAM DEVELOPERS			
867	Performance Technology	Instant Internet	NE34		Microsoft	Microsoft Back Office	228-229
853	Persoft	SmartTerm	NE13				
911	Symantec Corporation	Enterprise Developer	239				
OCR PRODUCTS							
	Epson America	Epson ES-1200C Pro Scanner	10-11				
243	File ABC	File ABC	241				

Reader Service No.

Company	Product	Page
Microsoft	Visual C++ Cross Tools	NE8-NE9
Microsoft	Authorized Technical Education	NE25
PROGRAMMERS TOOL UTILITIES		
Microsoft	Microsoft Back Office	228-229
Microsoft	Visual C++ Cross Tools	NE8-NE9
Microsoft	Authorized Technical Education	NE25
PROJECT MANAGEMENT		
249 AEC Software	Fast Track Schedule	250
148 Primavera Systems	SureTrak	80
Scitor Corporation	Project Scheduler for Windows	55
REMOTE COMPUTING		
238 3 Com Corporation	EtherLink Portable	221
Dell Computer Corporation	Dell Notebook Computers	128-127
853 Perisoft	SmartTerm	NE13
906 Symantec Corporation	pcAnywhere	90
US Robotics Inc.	Sportsster V.34	38
RESELLERS		
018 MegaHaus	Drives/Storage	294
010 Midwest Computer Works	Reseller	324-325
081 Sunshine Computers	Notebooks/Laptops	332
SCANNERS		
Canon Computer Systems	Canon IX-4015 Scanner	108-109
Epson America	Epson ES-1200C Pro Scanner	10-11
SERVERS		
308 Compaq Computer Corporation	ProLiant Servers	212-213
Computer Associates	Open Ingres	20-21
IBM PC Corporation	RS/6000	52-53
924 Micron Computer, Inc.	Znos Servers	NE2-NE3
SERVICE/SUPPORT		
Microsoft	Authorized Technical Education	NE25
SHAREWARE SOFTWARE		
AT&T	AT&T GIS PCs	114-115
SOFTWARE		
249 AEC Software	Fast Track Schedule	250
025 American Small Business Computers	Design CAD 2D	333
918 Artsort Inc.	LAMlastic 6.0	26-27
144 CompuUSA Direct	Mail Order	270-271
144 CompuServe	On Line Services	309-311
109 COMPUTER DISCOUNT WAREHOUSE	Software	295
925 Connectix	QuickCam for Windows	171
007 Connectix	RAM Doubler for Windows	253
243 File ABC	File ABC	241
219 Insight Direct	Software	328-329
027 Insight Direct	Software	374
Lotus Development Corporation	Notes/SmartSuite	168-169
Microsoft	Microsoft PowerPoint	2-3
Microsoft	Microsoft Publisher	176-177
275 NETCOM	Personal Internet Services	63
877 NetManage, Inc.	Chameleon 4.0	NE28
043 SPSS, Inc.	Statistical & Windows Software	293
061 STAC Electronics	Stac	263
906 Symantec Corporation	pcAnywhere	90
911 Symantec Corporation	Enterprise Developer	239
Visio	Visio Graphics Software	275
373 Visual Software	Visual Reality	251
SPREADSHEET/TEMPLATES		
WordPerfect/Novell Applications	Perfect Office	217-219
STATISTICAL SOFTWARE		
043 SPSS, Inc.	Statistical Software	293
TCP/IP		
877 NetManage, Inc.	Chameleon 4.0	NE28
TRACK BALLS		
Microsoft	Mouse & Nexus Keyboard	194-195
TRAINING/SEMINARS/CONFERENCES		
Microsoft	Authorized Technical Education	NE25
VIDEO GRAPHICS CARDS		
127 ATI Technologies Inc.	Mach 64-Bit Accelerator	18
389 Sigma Designs, Inc.	Video Capture Boards	383
002 VideoLogic Inc.	GraphuStar 64 Bit Video Cards	380-381
WINDOWS SOFTWARE		
249 AEC Software	Fast Track Schedule	250
025 American Small Business Computers	Design CAD 2D	333
918 Communication Intelligence	Handwriter for Windows	76
248 Computer Associates	Open Ingres	20-21
925 Connectix	QuickCam for Windows	171
007 Connectix	RAM Doubler for Windows	253
935 Datastorm Technologies	ProComm Plus for Windows	252
243 File ABC	File ABC	241
Microsoft	Microsoft PowerPoint	2-3
Microsoft	Microsoft Publisher	176-177
877 NetManage, Inc.	Chameleon 4.0	NE28
148 Primavera Systems	SureTrak	80
Scitor Corporation	Project Scheduler for Windows	55
SPSS, Inc.	Windows Software	293
Visio	Visio Graphics Software	275
373 Visual Software	Visual Reality	251
WordPerfect/Novell Applications	Perfect Office	217-219
WORD PROCESSING SOFTWARE/AIDS		
Communication Intelligence	Handwriter for Windows	76
WordPerfect/Novell Applications	Perfect Office	217-219
WORKSTATIONS		
IBM PC Corporation	RS/6000	52-53

For Additional Categories See MARKETPLACE PRODUCT INDEX, page 336.

Coming Up

The Top 100 CD-ROMs

We've done it again: Selected and reviewed the 100 best CD-ROMs released since last fall. For the second year in a row, we tell you what's worth buying so you'll know how to sort through the hundreds of titles available. We've also added lots of tips to help you keep on top of this ever-changing, hyperactive market. Our selection, from piles of CD-ROMs released on or later than September 1, 1994, includes titles for the office, the reference shelf, the home, the kids' room, the rec room, and the coffee table. Developers and publishers are keeping us on our toes: There's always a fresh new title just around the corner. And we always find it.

Departmental File Servers

File servers for midsize networks—those with 25 to 100 workstations—are maturing. No longer just beefed-up desktop systems with network interface cards and hefty hard disks, these new servers are designed from the ground up to maximize performance, expandability, security, and manageability. Still, there's a substantial gap between the best-of-breed systems and the ordinary ones. You need to know which machines are up to the task before you commit your critical data to them. We run 14 departmental servers through our NetBench tests to find out which ones deserve a spot in your server closet.

High-End Graphics Cards

A choice GUI application is only as good as its supporting hardware; serious 3-D modeling and desktop publishing require an equally serious graphics accelerator with hasty refresh rates at high resolutions. We review 16 graphics accelerator cards that target CAD, DTP, and graphics professionals; each PCI-based board handles at least 1,600-by-1,200 resolution and 16-bit color with a refresh rate of 60 to 85 Hz. We employ a suite of Windows, AutoCAD, raster, and vector graphics tests, and we pay special attention to OS/2 and Microsoft Windows NT driver support. In an accompanying story, frequent contributor Jan Ozer discusses the latest video technology, with a look at all the latest chips from such vendors as S3 and Video Logic.

Enhancing Your Notes Mail

Can you imagine life without e-mail? For many of us, e-mail has replaced other forms of communication in the workplace and, increasingly, Lotus Notes is the vehicle of choice. Notes is not the easiest program for new users to grasp, but there's a lot you can do to customize and enhance your Notes mail. Our next Extending Your Apps column shows you how to get started.

Editorial Product Index

Reader Service No.	Product	Company	Page
409	ACT! Mobile Link 2.0	Symantec Corp.	56
951	ARCserve for NetWare— Windows Edition, Version 5.01	Cheyenne Software Inc.	NE10
402	Astound 2.0 for Windows	Gold Disk Inc.	48
	Backup Director 4.0	Palindrome Corp.	NE12
463	Better Homes and Gardens Cool Crafts	Multicom Publishing	379
441	Borland ReportSmith for Windows 2.5	Borland International Inc.	214
468	Brother Multi-Function Center 4500 ML	Brother International Corp.	179
442	BusinessObjects 3.1	Business Objects Inc.	220
425	Canon BJC-70	Canon Computer Systems	51
469	Canon Faxphone B-170	Canon U.S.A. Inc.	184
957	Caravelle Watcher 2.0	Caravelle Networks Corp.	NE21
410	CardWizard Pro	SystemSoft Corp.	56
411	Cashé	Business Matters	61
408	CD Cabin 1.0	The Aldridge Company	56
448	Cheyenne BitWare for Windows 3.24	Cheyenne Communications Inc.	143
429	Compaq Presario CDS 774	Compaq Corp.	40
467	Creative Labs Phone Blaster	Creative Labs Inc.	160
443	Crystal Reports Professional 4.0	Crystal, a Seagate Software Company	222
419	Day-Timer Address Book	Day-Timer Technologies	62
431	DeltaGraph Pro 3.5	DeltaPoint Inc.	66
427	DPT SmartRaid	Distributed Processing Technology	54
444	Esperant 2.1	Software AG of North America Inc.	230
449	ExpressFax+ 3.0a	WordPerfect, the Novell Applications Group	145
450	FaxWorks Voice 3.0	Global Village Communication	145
407	FlowModel	Arcland Inc.	46
460	Flying Colors	Davidson & Associates	375
414	FrameMaker, Release 5	Frame Technology Corp.	61
421	GoldSync Remote Synchronization Gateway	ELAN Software Corp.	66
404	HP Colorado T1000	Colorado Memory Systems	49
412	HP DesignJet 250C	Hewlett-Packard Co.	61
401	HP LaserJet 5MP	Hewlett-Packard Co.	42
470	HP OfficeJet	Hewlett-Packard Co.	184
470	HP OfficeJet LX	Hewlett-Packard Co.	184
445	InfoMaker for Windows 4.0	Powersoft Corp.	235
435	Internet Assistant 1.0	Microsoft Corp.	37
446	Intersolv Q+E 6.1	Intersolv Inc.	238
422	IStore	Netscape Communications Corp.	66
471	JetFax 4	JetFax Inc.	196
462	Kid Pix Studio	Broderbund	376
459	Kid's World	Bit Jugglers Inc.	375
464	KidMail Connection	ConnectSoft	382
417	Kodak Digital Camera 40	Eastman Kodak Co.	37
423	KPT Convolver	HSC Software	44
472	Lanier 5010 MFD	Lanier Worldwide Inc.	196
958	LANRover/E Plus, Release 3.5	Shiva Corp.	NE23
952	Legato NetWorker 3.1 for NetWare	Legato Systems Inc.	NE16
403	Manage Pro 3.0 for Windows	Avantos Performance Systems Inc.	48
465	Material World	StarPress Multimedia	376
405	Math Office	Waterloo Maple Software	49
413	MGA Millenium	Matrox Graphics Inc.	61
955	Modem Assist PLUS 4.0	Synergy Solutions	NE29
416	Modem Blaster 14.4	Creative Labs Inc.	62
416	Modem Blaster 28.8	Creative Labs Inc.	62
451	MultiExpressPCS 3.2	Multi-Tech Systems Inc.	159
452	Multimedia Connect 1.6.2	Syncro Development Corp.	159
457	net.sex	Ziff Davis Press	69
954	NetModem/E 28.8, Release 3.5	Shiva Corp.	NE21
406	NeuralWorks Predict 1.0	NeuralWare Inc.	46
461	Nickelodeon Director's Lab	Viacom New Media	376
453	ObjIX Media Manager 1.03	ObjIX Multimedia Corp.	163
473	Okidata DOC-IT 4000	Okidata	199
474	Panasonic PFC KX-SP100	Panasonic Communications & Systems Co.	201
428	Pinnacle Micro RCD-1000	Pinnacle Micro Inc.	54
482	PowerBASIC Developer Kit for Windows	PowerBASIC Inc.	259
430	Profound	Profound Inc.	62
475	QMS 2001 Knowledge System	QMS Inc.	202
426	QMS magicolor LX	QMS Inc.	50
454	QuickLink MessageCenter 2.0	Smith Micro Software Inc.	164
434	QuickTake 150	Apple Computer Inc.	39
476	Relisys HomeScan Avec 140	Relysis	204
477	Ricoh MV715	Ricoh Corp.	204
418	Serif Publishing Suite	Serif Inc.	62
956	SMC EtherPower 10/100	Standard Microsystems Corp.	NE24
	Storage Director 4.0	Palindrome Corp.	NE12
415	SummaFlex	Summagraphics Corp.	61
455	SuperVoice 2.0e	Pacific Image Communications Inc.	166
953	The Norton Enterprise Backup	Symantec Corp.	NE19
424	TommySoftware Tek Illustrator 3.15	TommySoftware North America	44
478	Toshiba TF505	Toshiba America Information Systems Inc.	205
420	Trumatch SwatchPrinter Software 2.0	Trumatch Inc.	62
466	Under a Killing Moon	Access Software	382
480	VEXE, Version 1.0	Versatile Control Systems	259
481	Visual QuickBASIC, Professional Edition	Basmark Corp.	259
447	Visualizer for OS/2 1.11	IBM Corp.	240
456	VoiceFX 3.0	Orion Telecom Inc.	170
458	Washington Online	Congressional Quarterly Inc.	69
436	WebAuthor for Word for Windows	Quarterdeck Corp.	37
479	Xerox 3002	Xerox Corp., Desktop Document Systems	207
479	Xerox 3004	Xerox Corp., Desktop Document Systems	207
479	Xerox 3006	Xerox Corp., Desktop Document Systems	297

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Backup-UPS/Smart UPS 339/469
Backup-UPS Smart UPS 1250 439/579
Backup-UPS Pro 280 V/A 139
Backup-UPS Pro 420 V/A 219
Backup-UPS Pro 650 V/A 279

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850MB	IDE	WD2850A	10ms	3.5" 1H	249
1080MB	IDE	WD3100A	10ms	3.5" 1H	349
1280MB	IDE	WD31200A	10ms	3.5" 1H	375
1820MB	IDE	WD31600A	9ms	3.5" 1H	599
COMMER					
425MB	IDE	CF2540A	14ms	3.5" 1H	\$175
541MB	IDE	CF2540A	14ms	3.5" 1H	195
850MB	IDE	CF2850A	14ms	3.5" 1H	259
1275MB	IDE	CF21275A	10ms	3.5" 1H	389
Magpor					
425MB	IDE	MC7425A	12ms	3.5" 1H	\$175
540MB	IDE	MC7540A	12ms	3.5" 1H	199
850MB	IDE	MC7850A	12ms	3.5" 1H	259
1280MB	IDE	MC71280A	12ms	3.5" 1H	389
Q Quantum					
420MB	IDE	QULT420A	12ms	3.5" 1H	\$189
540MB	IDE	QULT540A	11ms	3.5" 1H	219
730MB	IDE	QULT730A	11ms	3.5" 1H	249
Seagate					
341MB	IDE	ST3385AG	18ms	2.5" 18mm	\$279
534MB	IDE	ST3565AG	18ms	2.5" 18mm	339
420MB	IDE	ST3401A	13ms	3.5" 1H	199
545MB	IDE	ST3582A	14ms	3.5" 1H	179
722MB	IDE	ST3780A	12ms	3.5" 1H	239
850MB	IDE	ST5850A	12ms	3.5" 75H	249
1083MB	IDE	ST31220A	12ms	3.5" 1H	345

Capacity	Interface	Model	Access	FF/Weight	Bare
MICROPLUS					
2100MB	SCSI	MC4221S	8.5ms	3.5" 1H	\$999
2100MB	SCSI	MC4221AV	8.5ms	3.5" 1H	1059
4300MB	SCSI	MC3243S	8.5ms	3.5" 1H	1339
4300MB	SCSI	MC3243AV	8.5ms	3.5" 1H	1439
9100MB	SCSI	MC1991	12ms	5.25" FH	2,199
9100MB	SCSI	MC1991AV	12ms	5.25" FH	2,299
COMMER					
1080MB	SCSI	CFP1080S	11ms	3.5" 1H	\$489
2147MB	SCSI	CFP2105S	8.5ms	3.5" 1H	899
2147MB	SCSI	CFP2107S	8.5ms	3.5" 1H	999
4294MB	SCSI	CFP4297S	9ms	3.5" 1H	1,579
Q Quantum					
540MB	SCSI	QULT540S	11ms	3.5" 1H	\$229
730MB	SCSI	QULT730S	11ms	3.5" 1H	249
1080MB	SCSI	QUEM1080S	9.5ms	3.5" 1H	339
1440MB	SCSI	QUEM1400S	9.5ms	3.5" 1H	739
2150MB	SCSI	QUEM2155S	8ms	3.5" 1H	899
4290MB	SCSI	QUQP4290S	8.5ms	3.5" 1H	1,329
Seagate					
1050MB	SCSI	ST31250N	8ms	3.5" 1H	\$699
1052MB	SCSI	ST31230N	8ms	3.5" 1H	499
2100MB	SCSI	ST32430N	8ms	3.5" 1H	899
2134MB	SCSI	ST12450W	8ms	3.5" HH	1,425
2139MB	SCSI	ST32550W	8ms	3.5" HH	1,069
2145MB	SCSI	ST32550N	8ms	3.5" 1H	999
4294MB	SCSI	ST15150N	8ms	3.5" HH	1,439
4294MB	SCSI	ST15230N	8ms	3.5" HH	1,269
4294MB	SCSI	ST15150W	8ms	3.5" HH	1,529
9080MB	SCSI	ST410800N	11ms	5.25" FH	2,999

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MYST MPC	49
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Select Phone	139
Small Blue Planet Windows	39
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All the Fun, None of the Fuss: Kids' Creativity Software

Once kids' art programs were simple tools for creating static drawings. Today's creativity packages allow budding artists to create anything from animated tableaux to full-fledged multimedia presentations. The four creativity packages we look at here range from those that offer multimedia in its most basic forms, such as Kid's World and Flying Colors, to the somewhat more ambitious Kid Pix Studio to the one-stop film production unit that is Nickelodeon Director's Lab.



Kid's World

Bit Jugglers Inc.; 800-454-4449.
Circle 459 on reader service card

★★★★★ \$39.95

Kid's World is a simple drawing package that is straightforward in concept and elegant in design. This program doesn't pretend to be either a serious drawing package or a multimedia studio, but it does offer a couple of entertaining and novel functions.

Kid's World's interface is basic, with just a few com-



Kid's World includes over 200 stamps, some of which interact with each other in fun ways.

mands and buttons to master. There is the usual number of paint tools, all easy to use. The graphics are big, bold,

bright, and colorful. There are 200 animated stamps, some of which interact with each other so that the cat stamp acts scared if placed near the dog stamp. Our only regret is that not enough of the stamps share this amusing interactivity.

You can choose from nine bold backgrounds including a backyard, a camp site, a dinosaur park, a farm, outer space, and the Wild West. Once you've populated your drawing with animals, trees, buildings, monsters, birds, and dozens of other objects, just push the Go button to bring your canvas to life. These witty little scenes are so much fun you won't want to put them aside, and fortunately you won't have to: Kid's World lets you save scenes as standalone Windows screen savers to keep for yourself or send off to your friends.

Kid's World may not be the most sophisticated drawing program on the market, but it's one of the most appealing and certainly one of the easiest to use.

Flying Colors

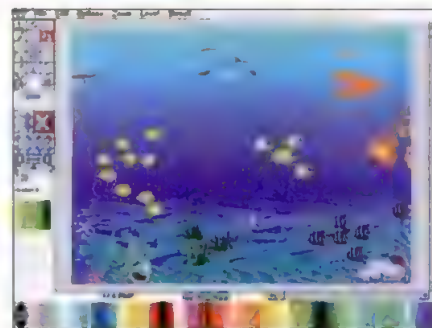
Davidson & Associates;
800-545-7677.

Circle 460 on reader service card
★★★★ \$40.00

Flying Colors is a creativity package that emphasizes creating from scratch rather than producing instant works of art. The program offers 17 drawing tools, many of which come close to re-creating the offerings of a professional illustration package. With a spray can, brush, eyedropper, and pen, along with the copy, paste, and stencil

commands (and a little talent), you can produce anything from a sports car to a fantasy landscape. To make the process easier, the program also provides symmetry tools, more than 200 gradient fills and patterns, a variety of cycling or flying colors for creating animated effects, 11 backgrounds, and 1,000 stickers. These are well drawn, but their range tends to be deep rather than broad. For example, you can put together all the pieces of a window frame, but you can't put furniture inside a house; there are no furniture or household appliance stamps. These types of stamps are available in add-on packs.

Still, Flying Colors tries hard to be a creativity program for the whole family, offering three user levels, each



Flying Colors offers a selection of sophisticated drawing tools and color cycling effects.

AFTER HOURS INDEX

Kids' Creativity Software

Kid's World.....	375
Flying Colors.....	375
Nickelodeon Director's Lab.....	376
Kid Pix Studio.....	376
CD-ROM Pick Hit	
Material World.....	376
Kids	
Better Homes and Gardens	
Cool Crafts.....	379

KidMail Connection.....	382
Quick Clips	
Atari 2600 Action Pack	
Interactive Entertainment	
Los Angeles Times Electronic	
Crossword Puzzles,	
Volume 1	
Multimedia IQ Test.....	382
Spotlight on Adventure	
Under a Killing Moon.....	382

with its own modifications of the interface. In Small Kids Mode, only the most basic tools are available; Beginners and Advanced Modes add new tools and features.

Flying Colors is a powerful creativity tool, but it's not for those seeking instant gratification. With a little effort and talent, though, you can use it to beautiful effect.

Nickelodeon Director's Lab

Viacom New Media:
800-469-2539.

Circle 461 on reader service card
★★★★    \$59.99

Nickelodeon Director's Lab aims to be a full-service multimedia studio for kids, but with completeness comes complexity: It takes study and



Director's Lab lets budding filmmakers try multimedia production.

patience to get the most out of the product. Nevertheless, for a budding filmmaker the results can be worth the effort.

Five doors appear on the main menu, each leading to a studio specializing in a particular art or craft. The Graphics Studio is where you create original drawings or edit the included illustrations. In the Title Workshop you prepare headlines, text, and, of course, the

Material World

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CD-ROM PICK HIT

These poignant photos combine with narration from world traveler Charles Kuralt, video clips, native music, country information, and a database of sortable statistics to create perhaps the most interesting and well-designed coffee-table book on CD-ROM yet to be produced.

—Gayle C. Ehrenman



StarPress Multimedia; 800-782-7944.

Circle 465 on reader service card

★★★★    \$59.95

all-important credits. In the Audio Studio you can compose original music, remix canned sound tracks, and add sound effects; if you have a microphone, you can record your own voice-over. The Video Studio is where the action takes place.

Finally, head to the Screening Room to watch the director's cut of your film.

Don't be fooled by the kid-friendly interface: This is a serious multimedia program that takes time and effort to master.

Kid Pix Studio

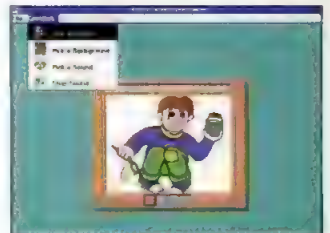
Broderbund Software:
800-521-6263.

Circle 461 on reader service card
★★★    \$45.00

This fourth offering in the Kid Pix line adds music, special effects, and animation to the standard drawing and stamping options. Unfortunately, the addition of multimedia elements doesn't make Kid Pix Studio look fresher.

From the main menu you can enter five areas in addition to the Kid Pix drawing program. The Moopies—kid-speak

movies, and the Digital Puppet allows kids to create animated cartoons. With the Slide Show you can combine pictures, animations, digital movies, and



Kid Pix's Digital Puppet lets kids create cartoons.

recorded sounds into a multimedia presentation.

The drawing program is where Kid Pix Studio really shows its age. The canvas is small, and the stamps and fig-

ures come in only two sizes: tiny and somewhat less tiny.

To the program's credit, you get a choice of over 500 static and 336 animated stamps. Kid Pix Studio's strength is its special effects. The electric mixer, for example, lets you move, shift, and pixelize your drawings.

But first you'll have to decipher the less-than-intuitive interface.—Donald B. Trivette

Here you can edit the included Nickelodeon videos or import your own footage.

Once you've created all the elements, it's time to head to the Multimedia Edit Suite to combine the pieces into a finished film. A storyboard at the top of the screen has slots for graphics, titles, music, sound, and video; you can add various wipes, fades, and effects to create a professional-looking pre-

sensation. Finally, head to the Screening Room to watch the director's cut of your film.

Don't be fooled by the kid-friendly interface: This is a serious multimedia program that takes time and effort to master.



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Flying Colors' cycling colors print as solid colors. To preview what they'll look like on paper, hit the Tab key. This stops the cycling on one solid color from the gamut.

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Kids

A Quick Solution to the Rainy-Day Blues

Better Homes and Gardens Cool Crafts

Multicom Publishing;
800-850-7272.

Circle 463 on reader service card

★★★     \$29.95

It's raining for the third day in a row, and you've run out of Disney videos and patience. But the kids are still whining about having nothing to do. It's just this sort of day that you'll appreciate Better Homes and Gardens Cool Crafts. This CD-ROM is filled with ideas for craft projects to keep little hands and minds occupied and out of trouble. All you have to provide are the supplies and the clean-up crew.

Based on a book by the

same name, Cool Crafts has about 100 projects, most of which involve cutting things out of paper, gluing, painting, or baking. You get step-by-

step instructions for such endeavors as making a snake from pasta, a zoo costume from a paper bag, and a just-hatched chick from cotton



You provide the supplies and Cool Crafts provides the instructions.

balls and an egg shell. All these crafts are explained through text, animations, and video clips. The projects are fun to create, but you've probably seen most of them before.

Cool Crafts is designed so that even small children can browse among the offerings. The user interface is bright, big, colorful, and consistent. Projects are listed in an alphabetical "Inducks" and also grouped by themes into twelve meowing Cat-egories ranging from Creepy Crawlies to Happy Holidays. And a "What Can I Make?" section finds projects based on the supplies you have in the pantry. A large selection of printable activity pages is an added bonus.

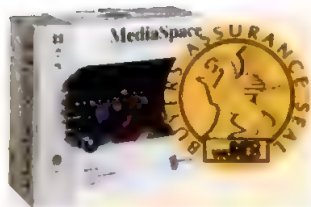
With a well-stocked kitchen and Cool Crafts in hand, you won't soon run out of activities.—Donald B. Trivette

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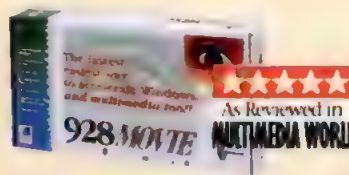
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After Hours

Kids

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KidMail Connection

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Circle 464 on reader service card

★★★★     

Do you leave your kids behind when you go e-mail surfing? Now that ConnectSoft, publisher of the popular E-Mail Connection for grown-ups, has released KidMail Connection, you no longer have an excuse to keep all the fun to yourself. KidMail is so easy and fun to use that after minimal practice even kindergartners will be exchanging messages with friends by themselves, while built-in safe-

guards let you control their on-line activity.

During each session, youngsters select one of three interfaces, such as a prehistoric motif. They then may choose to check their electronic mailbox on MCI Mail, CompuServe, or Prodigy; next, they can create original messages or choose to send one of the provided Quick Messages.

You, as the parental Postal Supervisor, control your child's KidMail profile. You can specify which on-line services your child can access and how many messages may be sent. And you specify approved recipients, which—thanks to Internet gateways—aren't necessarily limited to the three mentioned services.

ConnectSoft caught the perfect wave with KidMail. It's time to let your entire family hop on for a great ride.

—J.W. Olsen

QUICK CLIPS

Recommended
It's Your Call
Not Recommended

? Atari 2600 Action Pack

Those who cut their teeth on these early arcade games may be thrilled with this Windows CD-ROM, but for the rest of us, nostalgia goes only so far. \$29.95; Activision Inc.; 310-473-9200.

Interactive Entertainment

This monthly CD-ROM magazine should quickly become a gamer's best friend. Even After Hours can't give you more in the way of multimedia game reviews, previews, tips and hints, bug fixes, and patches than this disk can. \$9.95 per issue; Interactive Entertainment; 802-767-1230.

Los Angeles Times Electronic Crossword Puzzles, Volume 1

Combine the easiest-to-use of interfaces with some of the most challenging crosswords around and you get a package that's just plain fun. \$30; Random House Electronic Publishing; 800-733-3000.

? Multimedia IQ Test

If you're smart, you'll take the test to find out if you're smarter than your friends, but you'll ignore the superfluous talking-head video. \$19.95; Virtual Entertainment; 617-449-7567.

SPOTLIGHT ON ADVENTURE

Under a Killing Moon

You've been hearing about *Under a Killing Moon* for what seems like an eternity. But don't let that discourage you: This is one game that actually lives up to its own hype.

In *Under a Killing Moon*, you play Tex Murphy, a down-and-out P.I. living in postapocalyptic San Francisco. After an unexpected visit from your estranged mentor, you decide to try to scare up some business. You start talking to a mutant named Rook at the pawn shop and wind up investigating a string of petty burglaries. By exploring different locales and interacting with the peculiar cast of characters, you begin to piece together a grand conspiracy of monumental proportions.



This four-disk game literally immerses you in its fully rendered 3-D environment. Here, you can walk behind chairs and look under desks or up at the sky. When you come across an individual, you choose a personality for yourself

that you think will help get the answers that will crack the case. Do you want to be macho or sympathetic? Beg or act tough? The video segments here are among the best in gaming, and the puzzles are logical and solvable. There's also an exhaustive on-line hint feature.

If you're looking for a highly entertaining adventure game that combines humor, intrigue, and state-of-the-art technology, you definitely won't go wrong

with *Under a Killing Moon*.

—Shane Mooney

Access Software; 800-800-4880.

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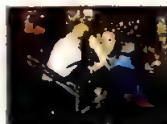
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Abort, Retry, Fail?

THE LIGHTER SIDE OF PERSONAL COMPUTING

By Don Willmott

She Said, He Said

"The changed attitude of my buddies in journalism is heartening. . . . You don't hear nearly so much anymore of that complaint about computers rendering us a nation of isolated, unsociable loners."—Meg Greenfield, *Newsweek*, February 27, 1995, page 84.

"Discount the fawning techno-burble about virtual communities. Computers and networks isolate us from one another."—Cliff Stoll, *Newsweek*, February 27, 1995, page 41.

Marketing lesson #23:
Don't turn your back
on your customers.
(*InformationWeek*.)



Groaners

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No wonder the baggage system doesn't work at the new Denver airport. Everything's backwards! (*Aviation Week & Space Technology.*)

Classified Intelligence

"Will trade sow, 300 lbs., for IBM starter computer, 3 1/2" FD/HD, DOS 5.0, WordPerfect 5.1; sow ready for freezer."—*THE TIMES* (MILBRIDGE, MAINE)



Richard Tennant

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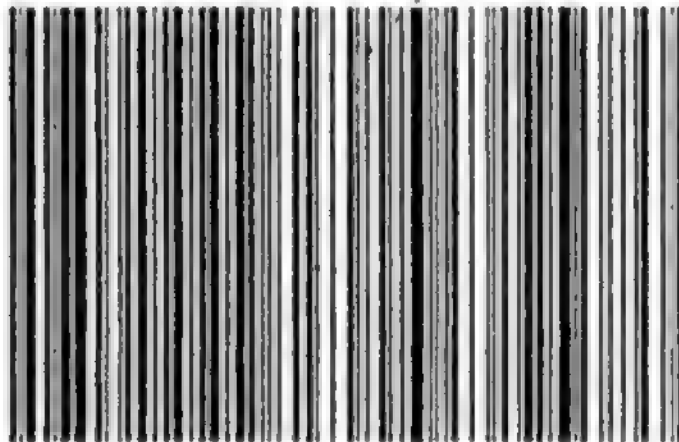
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1. Follow instructions on the other side

Back

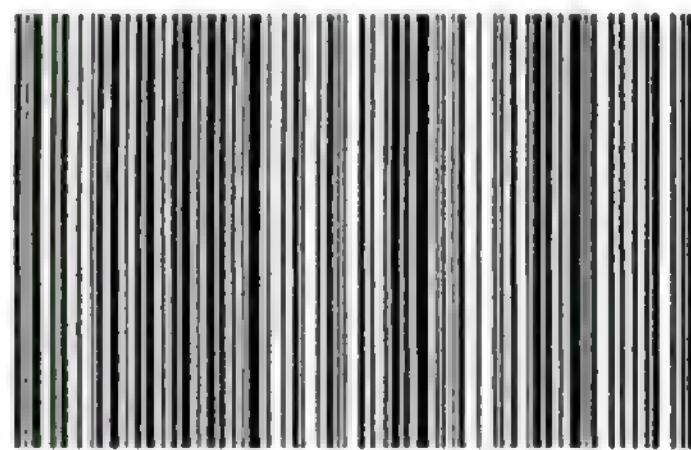
GB511PBACK 001B



Inverted Back

1. Follow instructions on the other side

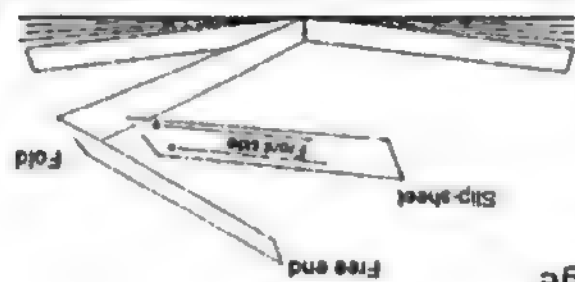
Folded edge of the page



GbsSlipSheet-001

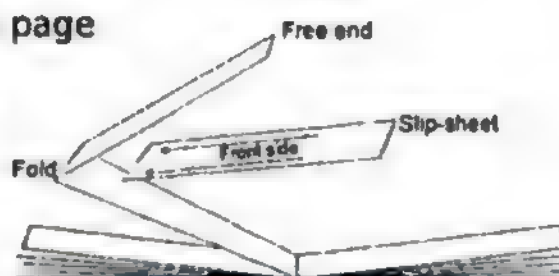
Inverted Foldout slip-sheet

Foldout slip-sheet



1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet

1. Open the foldout page
2. Insert this sheet with
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 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



WE'VE GON



Dell's featured computer artist is Daniel Fenelex.



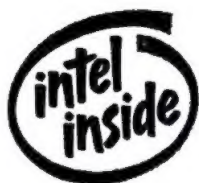
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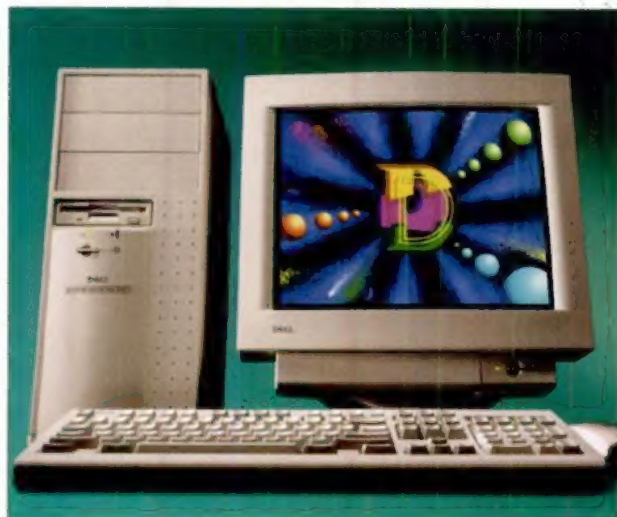
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